EPA/ROD/R04-00/079
2000

EPA Superfund
Record of Decision:

NATIONAL SOUTHWIRE ALUMINUM CO.
EPA ID: KYD049062375
OU 00
HAWESVILLE, KY
07/06/2000

National Southwire Aluminum NPL Site
Hawesville, Hancock County, Kentucky

FINAL
RECORD OF DECISION

U.S.E.P.A. - Region IV
Atlanta, Georgia
July 2000

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PART 1: DECLARATION

A. SITE NAME AND LOCATION

National Southwire Aluminum Site
Hawesville, Hancock County, Kentucky

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the National Southwire Aluminum Site near Hawesville, Hancock County, Kentucky, which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record for this Site.

The Commonwealth of Kentucky concurs with the selected remedy.

C. ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Final Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This response is the final action of the four (4) major remedial responses for this Site. The first response involved the initiation of a Remedial Investigation and Feasibility Study under an Administrative Consent Order. The second major response involved the building of a ground water extraction and treatment system utilizing the procedures fostered by the Superfund Accelerated Cleanup Model (SACM) initiative and under a Remedial Design and Remedial Action Consent Decree. The third response involved the proper closure of the Old South Slurry Pond utilizing a Non-Time-Critical Removal Action Memorandum and a Removal Administrative Consent Order. This fourth and final response action addresses the principal threats remaining at the Site by remediating the remaining areas of polychlorinated biphenyl (PCB) and polyaromatic hydrocarbon (PAH) contamination, and utilizing current policy-based TSCA PCB cleanup standards instead of site-specific, risk-based cleanup standards.

The selected remedy focuses on seven (7) areas of concern. The components of the selected remedy that apply to each of these focus areas are briefly listed below:

! Green Carbon PCB Spill Area.

> Land-use and ground water use deed restrictions; surface and subsurface “hot spot” removal to off-site secure landfill; rerouting utilities, where necessary; installation of a low permeability multimedia cap; operational controls to limit physical contact; monitoring of groundwater for PCBs; material with lower level PCB contamination disposed under the new Taylors Wash Landfill cap and cover.

! Refractory Brick Disposal Areas.

> Land-use and ground water use deed restrictions; install soil erosion cap, establish a grass cover, and install fencing with warning signs. Remove layer of sediment from lengths of the Drainage Ditch and Muddy Gut Tributary and dispose under the new Taylors Wash Landfill cap and cover or dispose off-site with other PCB soils.

! Taylors Wash Landfill Area.

> Deed restrictions; collection and treatment of leachate utilizing a new force main from the Landfill to the existing groundwater treatment plant; install RCRA Subtitle D multi-media cap and cover; install fencing with warning signs.

! Drum Storage Area.

Determine PCB and other COC concentrations of ‘hotspots’; excavate ‘hot spots’ and dispose of contaminated material under the new Taylors Wash Landfill cap; cover excavations with clean fill and appropriate surface treatment.

! PCB Soil Stockpile Area.

Excavate one foot of existing surface soils over the entire Area and dispose under the Taylors Wash Landfill cap after confirming PCB concentrations; install erosion cap over Area and establish grass cover.

! Site-Wide Groundwater Extraction and Treatment.

Impose deed restrictions for ground water use where not already imposed; continue ground water extraction and treatment as required by April 14, 1994 RD/RA Consent Decree (operate and maintain Ground Water Extraction and Treatment System); monitor Site-wide groundwater and Ground Water Treatment System KPDES discharge; investigate soils under Spent Potliner Accumulation Building.

! Old South Slurry Pond Closure/Post Closure.

Maintain existing cap and cover; impose land-use, deed restrictions for all four (4) ponds; monitor groundwater as a part of the Site-wide ground water monitoring.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Based on the size, dispersed locations, and low contaminant levels of the areas of contamination, EPA concluded that it was impracticable to treat the chemicals of concern in a cost-effective manner. Thus the remedy in this ROD does not satisfy the statutory preference for treatment as a principal element of the remedy. Because this remedy will result in hazardous substances remaining on-site above health-based levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five (5) years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. DATA CERTIFICATION CHECKLIST

We certify that the following information is included in the ROD:

R Chemicals of concern (COC) and their respective concentrations.
R Baseline risk represented by the COCs.
R Cleanup levels established for COCs and the basis for the levels.
R Current and future land and ground water use assumptions used in the baseline risk assessment and ROD.
R Land and ground water use that will be available at the Site as a result of the Selected Remedy.
R Estimated capital costs, operation and maintenance (O&M) costs, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.
R Decisive factor(s) that led to selecting the remedy (i.e., Community Acceptance and State Acceptance of a selected remedy which targets specific contaminated areas to reduce risks to acceptable levels).

G. AUTHORIZING SIGNATURE

Division Director
Waste Management Division
Region IV
United States Environmental Protection Agency

6 JUL '00

Date

PART 2: DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

A.1 Site Name and Location

The CERCLIS USEPA ID Number of the National Southwire Aluminum (NSA) Site is KYD049062375. The Site is an active facility located in Hancock County, Kentucky, on the floodplain of the south side of the Ohio River west of Hawesville, Kentucky, and across the River from Cannelton and Tell City, Indiana.

A.2 Lead and Support Agencies

The lead agency for the CERCLA regulatory response at the Site is the USEPA, Region IV, Atlanta, Georgia. The support agency for the CERCLA regulatory responses at the Site is the Kentucky Department for Environmental Protection (KDEP) which is a part of the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC).

A.3 Source of Cleanup Monies

The monies for the response at the Site have largely come from the potentially responsible party (PRP), Southwire Company, the parent company of NSA. Under an Administrative Order on Consent (AOC) for a remedial investigation and feasibility study (RI/FS), a Consent Decree for an RD/RA, and an AOC for a Non-time Critical Removal, the PRP is obligated to pay USEPA's oversight costs as well as the costs of the RI/FS, an engineering evaluation and cost analysis (EE/CA) and the remedial design and remedial action (RD/RA) for a ground water extraction and treatment system, an FS and design for the closing of an air pollution control (APC) dust slurry pond, and the imminent RD/RA for the final Site response described in this Final ROD.

A.4 Site Type

The Site is an active aluminum refining facility and has several different areas of contamination which have been addressed by past responses and will be subject to final responses as a result of this Final ROD. These areas of contamination include: landfills, former temporary storage areas for stockpiled PCB-contaminated soils and debris, cyanide-contaminated ground water plumes, discrete areas of spotty PCB-contaminated soils, an area of severely PCB-contaminated subsurface soils, and four (4) APC slurry impoundments (three are closed and subject to O & M).

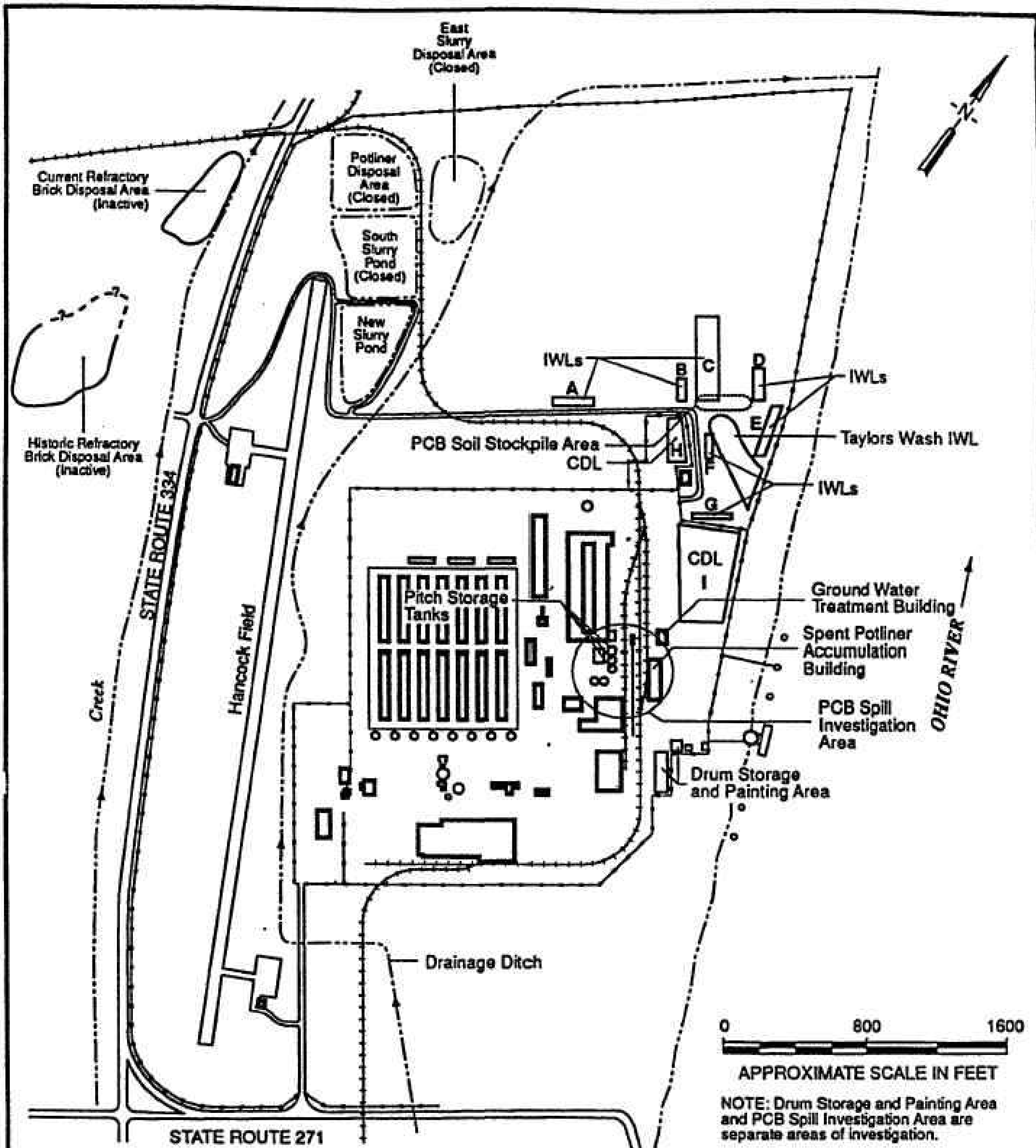
A.5 Brief Site Description

The NSA facility is an active, operating aluminum refining operation, which is a subsidiary of the Southwire Company based in Carrollton, Georgia. The Site is located on an approximately 900-acre tract of land in Hancock County, Kentucky. This Site is situated within the broad alluvial flood plain of the Ohio River of northwestern Kentucky, approximately twenty (20) miles east of Owensboro, Kentucky (Figure A - 1).

BASE MAP SOURCE: USGS 7 1/2 minute topographic quadrangle map, Tell City, Indiana-Kentucky 1961, photorevised 1980.

National Southwire Aluminum Site
Hawesville, Hancock County, KY

Figure A - 1
Site Vicinity Map



LEGEND:

- Fence
- Railroad Spur
- Intermittent Ditch or Creek and Flow Direction
- IWL Industrial Waste Landfill
- CDL Construction Debris Landfill

National Southwire Aluminum Site
Hawesville, Hancock County, KY

Figure A - 2
Main Facility Layout

The Site has been utilized from 1969 to the present, and is currently an active facility. The operation produces primary aluminum from alumina ore. Site features include a number of manufacturing and service buildings (Figure A - 2), three (3) former Site waste disposal impoundments, one (1) active wastewater impoundment, several former waste disposal landfills, a potliner accumulation building, and a drainage ditch. In the central-western portion of the Site is the Hancock County Airport. At the southeastern portion of the Site is the Southwire Rod and Cable Mill (also a division of Southwire Company of Carrollton, Georgia). Adjacent to the Site (northwest) is the Big Rivers Power Plant which supplies electric power to the NSA facility.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

B. 1 Site Activities Leading to Current Problems

The production process and materials utilized are responsible for a wide variety of contaminants at the Site. These contaminants include, but are not limited to: cyanide (CN), fluoride (F), arsenic (As), copper (Cu), iron (Fe), manganese (Mn), magnesium (Mg), nickel (Ni), zinc (Zn), beryllium (Be), titanium (Ti), vanadium (V), sodium (Na), gallium (Ga), and cadmium (Cd). Cyanide is produced as an impurity in the carbon linings of reduction vessels called "pots" during the production of aluminum. Appreciable amounts of total cyanide reside in the potliners at levels up to 2,500 ppm. The facility has over 450 active carbon-lined pots. The aluminum-reducing pots are operated continuously until the carbon liner begins to burn through. This takes approximately 5-10 years to occur. Once a pot begins to experience burn-through, it is taken out of service and replaced with a reconditioned pot. The decommissioned pot is prepared for use again by removing and replacing the carbon liner (potliner). In 1971, potliner removal began at the facility. In 1973, a concrete pad called the dump pad was constructed specifically for the removal of potliners.

The potliner removal concrete pad was upgraded to an enclosed containment structure in 1990. This building is now referred to as the Spent Potliner Accumulation Building. Prior to 7/25/86, the potliners were disposed of on-site in the Old North Pond, which was later capped and closed. According to NSA, 26,000 cubic yards of spent potliners were disposed in the Old North Pond. After this time, the potliners were shipped off-site to a USEPA-approved disposal facility. At present, NSA generates approximately 250 tons of spent potliner each month (3,000 tons/year).

Since initiating Superfund activities at the NSA Site, USEPA required NSA to periodically sample the ground water at the Site. This monitoring has indicated elevated levels of contaminants. It appears that these contaminants (specifically, fluoride and lesser amounts of cyanide) are migrating from the Old South Pond into the center of the North Plume. Previous data indicated that these contaminants were present; however, none of the data indicated that the Old South Pond was a significant source. This could only have been identified by periodic downgradient ground water sampling and by re-sampling Pond wastes. Periodic well sampling combined with additional information generated as part of the Remedial Investigation confirmed that the Old South Pond posed a potential problem at the Site due to hydraulic loading.

Dumping in the Old North Pond was well-documented and suspected of being the most significant problem since spent potliners disposed in this location contained up to 2,500 ppm cyanide. The Old North Pond was closed utilizing a synthetic liner, clay, and soil in 1986. It was necessary to take action at the Old South Pond which will prevent additional infiltration of rainwater which facilitates mobilization of contaminants from the Old South Pond into the North Plume. Remediation of the Old South Pond began in mid-1995. The removal was accomplished by employing a Non-Time Critical Removal Action that significantly reduced the hydraulic loading of the area and mitigated the migration of contaminants into the local ground water. This allowed the new pump and treat system to operate more efficiently by preventing the system from being overly affected by Old South Pond contaminants.

B.2 State and Federal Investigations

Enforcement activities were initiated in 1985. A Preliminary Assessment (PA) was completed on February 25, 1986 by the Kentucky Division of Waste Management, under the USEPA CERCLA PA/SI Cooperative Agreement with USEPA Region IV. This assessment indicated that the NSA Site had significant contamination, further studies were warranted, and the Site was a good candidate for the NPL. As a result, a high priority Site Investigation was conducted. A Site visit was made at NSA on May 8, 1986, and an investigation was performed on May 12, 1986 by the Commonwealth of Kentucky Division of Waste Management.

On July 26, 1989, a Notice of Violation (NOV) was issued to NSA by the Kentucky Division of Water because of contaminated sediment that existed in the on-site drainage ditch which drained active industrial areas of the Site. The inspection report indicated that EP dust from the air pollution control system (APC) had entered the ditch, and called for removal of the dust and any blackened sediment. In response to the NOV, NSA removed sediment from approximately 4,800 feet of the drainage ditch. Approximately 2,000 cubic yards of material was excavated from the drainage ditch and disposed in the New South Pond.

Other NOVs were issued in November of 1990 and February 1992, respectively. The 1990 NOV was issued due to excessive total recoverable zinc and copper concentrations in discharge from storm water outfall # 006. As a result, NSA modified the EP hopper and excavated approximately 4,200 square yards of rock and soil from the area of the scrubbers to the Old South Pond. The scrubber area was then covered with asphalt to further reduce the potential for EP dust to enter stormwater ditches. These construction activities were completed on August 22, 1991. Activities initiated to comply with the February 1992 NOV included a compliance schedule and a proposed sampling schedule.

In the late 1980's, the Commonwealth of Kentucky referred the Site to USEPA for ranking under the Hazard Ranking System (HRS). In 1990 and 1991, samples from surface soils, subsurface soils, sediments, surface waters. monitoring wells, industrial wells, and some private wells were collected during the USEPA Preliminary Field Investigation as reported in the Interim Final Listing Site Inspection Report (LSI) by NUS Corporation (April 1991). The HRS Score generated for the NSA Site was 50.0 out of a possible 100.0 points. Conclusions from the LSI indicated that on-site ground water, soils, and drainage ditch sediments contain significant levels of cyanide, fluoride, and metals. NSA has stated to USEPA that it had cleaned out a drainage/effluent ditch that was found to contain significant concentrations of fluoride and metals. In anticipation of the Site being listed as final on the NPL. NSA (through its consultants) had also collected additional data regarding the environmental condition of the NSA property.

B.3 Enforcement History

B.3.1 NPL Listing

The NSA Site was proposed for inclusion on the National Priorities List (NPL), as defined in Section 105 of CERCLA, as amended by SARA (P.L. 99-499), in July 29,1991. The NSA Site was listed final on the NPL on May 31, 1994.

B.3.2 RI/FS AOC

In September 1992, NSA signed an Administrative Order on Consent (AOC) to perform an RI/FS. NSA, through their contractors, has completed the RI and has submitted the Final RI Report. The USEPA and Commonwealth of Kentucky have overseen all RI/FS and related Site study activities. The Baseline Risk Assessment, which is also part of these studies, was initially begun by USEPA, but during 1996 the PRP was offered the opportunity to complete the risk assessment under a change in USEPA policy. The Rl/FS and risk assessment were completed in 1999 and supports this Final ROD.

B.3.3 RD/RA Consent Decree

Building upon the initial information produced by the above-mentioned RI, in Interim ROD, focusing upon the remediation of cyanide- and fluoride-contaminated ground water plumes in the northern and southern parts of the Site, was finalized in February 1993. A Consent Decree for a fast-tracked RD/RA under the Superfund Accelerated Cleanup Model (SACM) initiative was completed in February 1994. The RD was completed in December 1994 and the ground water extraction and treatment system construction was completed in April 1995 and began operating shortly thereafter. The treatment system continues, to operate, discharging effluent under an NPDES (i.e., Kentucky Pollutant Discharge Elimination System or KPDES) permit, and monthly performance reports are submitted to USEPA and Kentucky under provisions of the Consent Decree.

B.3.4 AOC for a Non-Time-Critical Removal Action

In late 1994 ground water monitoring evidenced the existence of two cyanide plumes at the Site. The northernmost plume emanated from the area of the two closed APC slurry impoundments and a third open, but not active impoundment or pond. A non-time-critical removal action memo for the closure of the open impoundment known as the Old South Slurry Pond was completed in June 1995 and an AOC w as signed in October 1995. An abbreviated design was immediately undertaken by the PRP and the dewatering (Dewatering of thixotropic APC dust slurry was a lengthy process requiring a slow “squeezing” of the water from the slurry.), capping, and covering of the Pond was fully completed and documented by September 1997.

B.3.5 RCRA Enforcement History

NSA generates spent pot liners from their primary aluminum reduction process. NSA also generates a small number of paint filters from spray paint booths. These wastes have been disposed in the Potliner Disposal Area (Old North Pond). Spent potliners (K088) and paint filters (F017) were listed as hazardous wastes, in Interim Final Regulation, in the Federal Register dated July 16, 1980. In anticipation of final listing of these wastes, NSA filed a RCRA Part A application in November 1980, and gained interim status. K088 and F017 were temporarily suspended as listed hazardous wastes in the Federal Register dated January 16, 1981. Subsequently, NSA requested withdrawal of their Part A application and received approval in July 1982 from Kentucky and USEPA. K088 waste was listed as a hazardous waste by USEPA effective March 13, 1990. Spent potliner material was identified as a listed hazardous waste under Kentucky’s regulations on May 23, 1990. NSA is not regulated as a RCRA TDSF, but as a RCRA large quantity hazardous waste generator.

Authorized representatives of the Cabinet inspected NSA on September 10, 1991, and identified the following violations of KRS Chapter 224 and the regulations adopted thereunder:

a. 35:030, Section 7 - Failure to make arrangements with local officials.

b. 35:030, Section 4 - Failure to keep records of incoming waste to the waste pile.
c. 35:050, Section 4 - Failure to have cost estimates for closure/post closure work.
d. 38:020, Section 2 - Failure to operate consistent with its Part A application.
e. 35:2 10, Section 4(l)(a) - Failure to have the waste pile on an impermeable base.
f . 35:210, Section 4(2)(b) -Failure to prohibit liquid from run-on to the waste pile.

On October 3, 1991, the Cabinet issued NSA a Notice of Violation (NOV) for the violations identified on September 10, 1991. NSA responded to the NOV and the allegations therein in October 1991. On December 20, 1991, NSA began use of a large steel container within the Spent Potliner Accumulation Building for accumulation and storage of spent potliners for periods of less than 90-days. On January 27, 1992, an authorized representative of the Commonwealth visited the NSA plant and observed the waste potliner management operation. It was noted that NSA had constructed a large container in the Building used for potliner removal and accumulation. NSA had been using this container to accumulate and store waste potliners for periods of less than ninety (90) days. On April 23 and 29, 1993, an authorized representative of the Commonwealth inspected the NSA plant and cited NSA for the following violations of KRS Chapter 224 and the regulations adopted thereunder:

a. 35:050, Section 4 - Failure to maintain closure/post closure cost estimates.
b. 38:020, Section 2 - Operation not consistent with its Part A application.
c. 35:210, Section 4(l)(a) - Waste pile not on an impermeable base.
d. 35:210, Section 4(2)(b) - Free liquid not being prohibited from waste pile area.
e. 32:030, Section 1 - Failure to use DOT-approved containers for accumulation of K088 waste.
f. 35:020, Section 6(4) - Failure to record the date and nature of repairs or other remedial actions in the inspection log.
g. 47:110, Section 3 - Failure to submit a revised registration listing all of the solid waste disposed of at the solid waste incinerator.
h. KRS 224.40-100 and 224.40-305 - Disposal at other than a permitted facility (i.e. hydraulic oil spillage, oil/pitch spillage at transfer and storage areas.)

On May 26, 1993, the Commonwealth issued an NOV to NSA for the violations identified on April 23 and 29, 1993. NSA responded to the NOV and the allegations therein by letter dated June 10, 1993. On March 22 and 23, 1994, an authorized representative of the Cabinet inspected NSA and cited NSA for the following violations of KRS Chapter 224 and the regulations adopted thereunder:

a. 35:050, Section 4 - Failure to maintain closure/post closure cost estimates.
b. 32:0 10, Section 3(4) - Failure to identify D002 waste streams on registration.
c. 35:210, Section 4(l)(a) - Waste pile not on an impermeable base.
d. 32:040, Section 2(l) - Failure to submit correct information on the 1993 Annual Report.
e. 32:010, Section 2 - Failure to make proper waste determination.
f. 32:030, Section 5 - Failure to label a container "Hazardous Waste" and failure to conduct annual retraining.
g. 45:020, Section 2(l)(a) - Failure to notify the Commonwealth of the use of the Refractory Brick Disposal Area for disposal and failure to obtain a special waste landfill permit.
h. KRS 224.40-100 and 224.40-305 - Disposal at other than permit facility (i.e., the Drum Storage Area, the gravel area outside the ball mill grinder, and the Refractory Brick Disposal Area).

On April 7, 1994, the Cabinet issued an NOV to NSA for the violations cited on March 22 and 23, 1994. NSA responded to the NOV and the allegations therein by letter dated April 22, 1994. On May 11 and 12, 1995 an authorized representative of the Commonwealth inspected NSA and cited NSA for the following violations of KRS Chapter 224 and the regulations adopted thereunder:

a 35:210, Section 4(l)(a) -Failure to demonstrate that waste pile is located on an impermeable base.
b. 35:050, Section 4 - Failure to have closure/post closure cost estimates for the waste pile.

On May 18, 1995, the Commonwealth issued an NOV to NSA for the violations cited on May 10 and 11, 1995. NSA responded to the NOV and allegations therein by letter dated May 30,1995. The Commonwealth asserted that NSA is responsible for closure of the Interim Status hazardous waste storage pile identified in the Commonwealth's June 16, 1991 inspection of NSA's Hawesville facility. NSA disagreed with this assertion. The Cabinet asserted that pursuant to KRS 224-46-530, the NSA facility was. subject to corrective action. NSA disagreed with this assertion.

B.3.6 NPDES and Other Permits

Currently, NSA holds the following permits: KPDES (NPDES) #KY0001821 for the discharge of storm water, noncontact cooling water, minor process water flows, treated discharge from the new ground water treatment plant, and treated sanitary waste water into the Ohio River; Air (Operating) #0-82-25 for air emissions; and a Certificate of Registration for Hazardous Waste Activity #KYD049062375. While the KPDES Permit is not required if the point of discharge is located within the boundaries of a Superfund Site, the USEPA and the Commonwealth of Kentucky felt that implementation of this permit added significant advantages from a regulatory standpoint.

B.3.6 TSCA

In 1991. during the excavation of a cooling tower foundation near the eastern portion of the Site, PCBs were encountered at approximately twelve (12) feet below land surface. NSA coordinated an investigative effort on this contamination with the USEPA Toxic Substances Unit (enforces TSCA or "TOSCA"). Sampling and analyses were conducted in order to characterize contaminant levels within the cooling to tower foundation. Sheet pilings at the excavation were grouted to prevent additional PCB oils from entering the excavation. Forty-two (42) composite samples were subsequently taken of the PCB-contaminated soils temporarily stored at an on-Site staging area, the PCB Soil Stockpile Area. NSA removed approximately 850 cubic yards of PCB-contaminated soils at the excavation for a cooling tower footing. One hundred thirty (130) truck loads of PCB-contaminated soils were transported and disposed at the Chemical Waste Management facility in Emelle, Alabama. During this sampling event, PCB levels were detected in these soils from below 1 ppm to approximately 8,940 ppm. These areas were further investigated under the Superfund program and will be addressed as part of the final Site remedy.

C. HIGHLIGHTS OF COMMUNITY PARTICIPATION

C.1 Historical Community Relations Highlights

The U.S. Environmental Protection Agency (USEPA) established a Public Comment Period from 1/7/93 to 2/7/93 for interested parties to comment on USEPA's Proposed Plan for Interim Remedial Action at the NSA Site. No extensions were requested to the Public Comment Period. A Public Meeting was held on 1/19/93 and conducted by USEPA at the Hancock County Middle School near Hawesville, Kentucky. The meeting presented the results of previous investigations at the Site and described USEPA's conceptual approach to the future remediation of the NSA Site. USEPA also discussed the initiation of an RI/FS to acquire additional information so that a Final Site Remedy can be implemented.

C.2 Public Notices

Advertisement of the Proposed Plan and the public meeting for the Interim ROD was published in the HANCOCK CLARION on January 7, 1993, and in the PERRY COUNTY NEWS on January 11, 1993.

The advertisement for the Proposed Plan for the Old South Slurry Pond non-time-critical removal appeared in the MESSENGER-INQUIRER on Thursday, February 23, 1995.

USEPA arranged for a public notice for the Proposed Plan for the Final ROD to appear in local newspapers the week of July 26, 1999.

C.3 Proposed Plans

The Proposed Plan for the Interim ROD was presented to the public in a fact sheet released on January 6, 1993 and at a public meeting on January 19, 1993.

The Proposed Plan for the closure of the Old South Slurry Pond was issued in February 1995.

Copies of the Proposed Plan Fact Sheet for the Final ROD were mailed to mailing list participants the week of July 19, 1999.

C.4 Public Meetings

The public meeting for the Proposed Plan for the Interim ROD occurred on January 19, 1993 at the Hancock County Middle School.

The public meeting for the Proposed Plan for the Old South Slurry Pond non-time critical removal occurred on March 2, 1995 at 7:00 PM at the Lewisport Community Center in Lewisport, Kentucky.

The public meeting for the Proposed Plan for the Final ROD took place at the Lewisport Community Center in Lewisport. Kentucky, on July 28, 1999, at 7:00 PM.

C.5 Public Comment Periods

The public comment period for the Proposed Plan for the Interim ROD occurred between January 7, 1993 and February 7, 1993.

The public comment period for Old South Slurry Pond closure Proposed Plan was from February 9, 1995 to March 9, 1995.

The public comment period for the Final ROD Proposed Plan, as armoun6ed, lasted from July 28, 1999, to August 28, 1999.

D. SCOPE AND ROLE OF RESPONSE ACTIONS

D.1 Sequence of Actions

Initially, after the NPL Listing of the Site, USEPA planned for a standard Superfund remedial approach to the actions at the Site. The process began with negotiations for an RI/FS AOC and the start of the RI. However, once ground water data produced under the first steps of the RI indicated that cyanide, fluoride, and metals were contaminating significant portions of the floodplain aquifer within the Site boundaries, a more rapid interim response was undertaken. The then new Superfund Accelerated Cleanup Model (SACM) initiative was utilized instead of a standard Superfund remedial approach. An Interim ROD was written utilizing the data already produced under the ongoing RI. An RD/RA Consent Decree was negotiated and referred to USEPA Headquarters and the U.S. Department of Justice. After the Consent Decree was final in April 1994, a design for a ground water extraction and treatment system was finished. The construction of the extraction wells, booster station, main treatment plant, and discharge system were completed in April 1995. The treatment system will continue to operate until the standards for cyanide in ground water are consistently met, which is expected to occur ten (10) years after the startup of the treatment system (i.e., in 2005). The initiation of the ground water remediation system is considered a necessary interim step (Operable Unit One) in the achievement of a Site-wide remedy.

As more data were produced by the ongoing RI it became apparent that a major source of the cyanide was residue from past potliner disposal activities in and near the closed APC slurry impoundments in the northwest portion of the Site. One unclosed, but unused seven-acre impoundment or pond, the Old South Slurry Pond was the source of a significant portion of the cyanide and fluoride contamination and needed to be dewatered and capped. Using information produced by the ongoing RI, an EE/CA was completed and a Non-Time-Critical Removal Action Memo was finalized in June 1995. An Action Memo and an AOC allowed the PRP to fund and conduct the closure of the Old South Slurry Pond with completion in September 1997. The Slurry Pond closure was not considered an operable uni, but was considered a removal.

As the RI and the FS became finalized, the final remedy began to coalesce. Seven (7) focus areas for remediation were outlined for the final remedy which is described in this Final ROD. The selected remedy in the Final ROD is a Site-wide final remedy which takes into consideration prior remedial and removal responses, including the lengthy RI/FS; it is considered Operable Unit 00. In addition to the soil remediations, continued operation and maintenance (O & M) of the ground water extraction and treatment system, the O & M necessary to the effectiveness of the areas to be remediated, and the continued monitoring of ground water quality are set forth in the Final ROD.

E. SITE CHARACTERISTICS

E.1 Conceptual Site Model

The Conceptual Site Model (CSM) upon which the risk assessment and response action are based is described in Figure E - 1. The CSM is the map of the exposure pathways at the Site which dictates the focus of the Final ROD's remedy analysis and the eventual concentration of remediation efforts in the selected remedy. The CSM ties the potential sources of contamination (i.e., releases) to the pathways for contaminant migration and then to the receptors associated with those pathways.

E.2 General Overview

The potentially affected NSA property and proximal properties total about 900 acres. The main facility and areas immediately affected by contamination total at least 400 acres.

E.2.1 Geography

The NSA Site is located in the broad Ohio River Valley floodplain . (Figure A - 1). The geographic coordinates are 35E 56'42" N latitude and 086E 47'16" W longitude. This area is within the Central Lowland Physiographic Province and is located adjacent to the northern boun . dary of the Western Coal Field region of Kentucky.

E.2.2 Topography

The NSA Site is located in the broad Ohio River Valley floodplain. The land surface is characterized by very low relief and lies approximately 40 feet above the normal water level of the Ohio River (358 ft msl). The flood plain extends approximately one (1) mile west of the Site. At this location there is an escarpment approximately 100 feet in elevation.

Surface water drainage follows the low topographic relief at the Site. Relatively poor surface water drainage in the northwest and central portion of the Site is strongly influenced by impermeable clay and silt lenses. The one anomalous feature is the man-made drainage ditch that cuts across the Site generally from south to north, then east into the Ohio River.

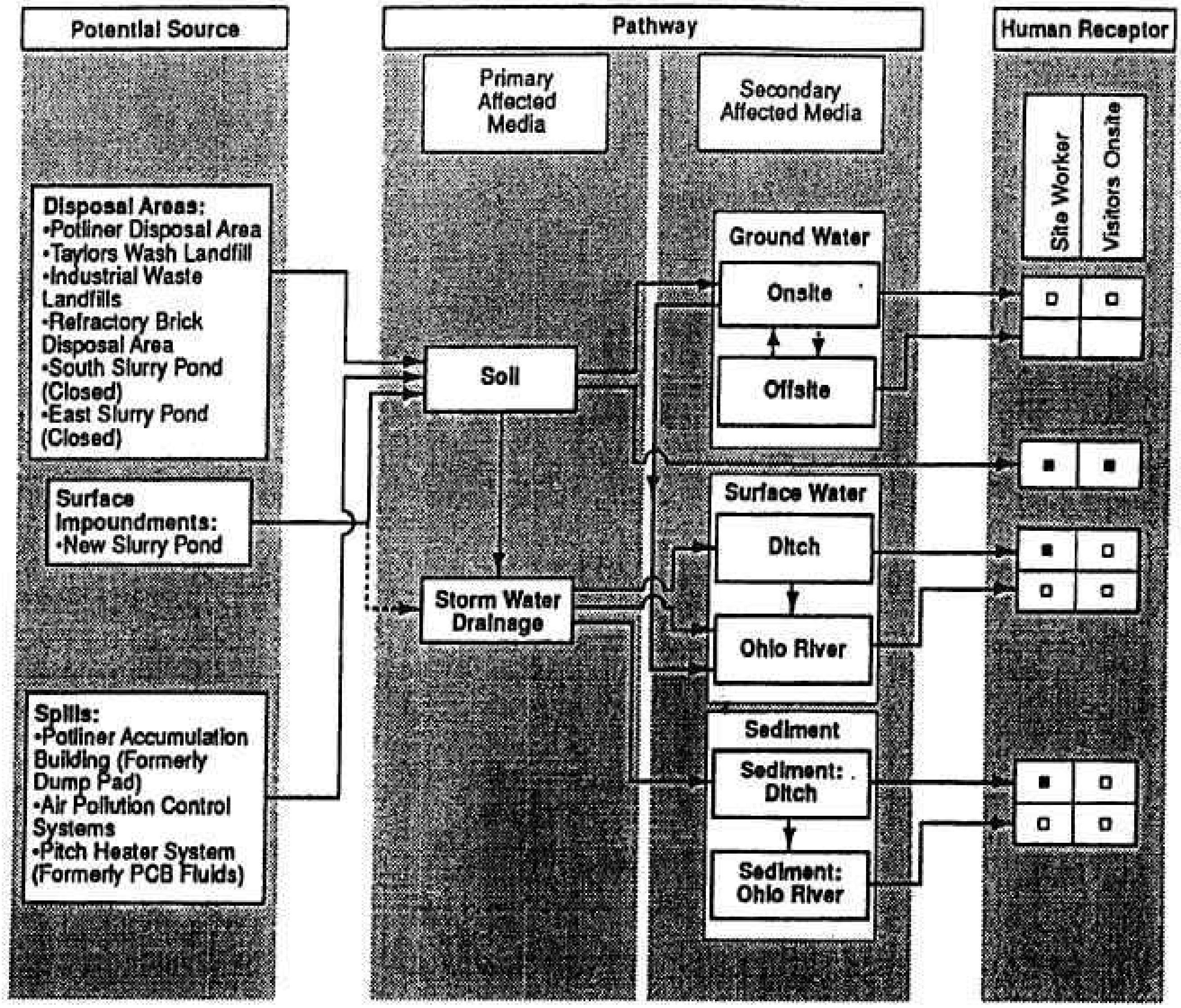
E.2.3 Geology

Geologically, there are three (3) stratigraphic zones of interest at the Site. The Site is situated on the Quaternary aged Ohio River Valley alluvial deposits. The alluvium can be divided into two (2) sections: 1) the lower member of approximately 115-foot thickness on average, characterized by coarse-grained sand and gravel with occasional beds or lenses of silt and clay, and 2) the upper member with an average depth of approximately twenty-five (25) feet characterized by fine-grained silts and clays with occasional lenses of gravel and coarse-grained sand. The depth of the top of bedrock at the Site is approximately 267 feet above MSL.

Below the alluvium are two Paleozoic groups, the Tradewater and Caseyville formations. The Pennsylvanian aged Tradewater Formation consists of numerous members that are generally composed of shale, sandy shale, carbonaceous; shale, sandstone, limestone, and coal. The thickness of the Pennsylvanian aged strata ranges from about 350 to about 500 feet.

Below the Tradewater is the Caseyville Sandstone, which represents the bedrock unit at the Site. It is divided into three (3) sections. The uppermost Bee Springs Sandstone member is a massive, coarse-bedded, medium-grained sandstone containing quartz pebbles, which laterally grades into shales. The Battery Rock Coal member contains shale, sandy shale, sandstone, and thin beds of limestone, and coal beds. The lower conglomerate member is a massive, cross-bedded, medium-grained sandstone veined with quartz, which grades into shale laterally.

Soils at the Site have been generally described in previous studies as 1-3 feet of brown silty-loam topsoil with roots underlain by 5-6 feet of brown silt to very fine grained sand or sandy clay. In actuality, there are twelve (12) soil types that have been identified by the USDA Soil Conservation Service Soil Survey (1974) including Hancock County. A summary of Site soils information is presented in Appendix A of the Engineering Evaluation/Cost Analysis (EE/CA) done for the Old South Slurry Pond closure.



LEGEND:

- Confirmed Pathway and Flow Direction
- Possible Pathway and Flow Direction
- ■ Exposure Probable - Assessment Performed
- □ Exposure Possible -

National Southwire Aluminum Site
Hawesville, Hancock County, KY

FIGURE E - 1
Exposure Scenarios
Conceptual Site Model

E.2.4 Hydrogeology (Aquifers of Concern)

Groundwater at and near the site, is Potentially available, from two aquifer sources: (1) the alluvial aquifer that spans laterally across the Ohio River Plain, and (2) the aquifer found in the Palcozoic rock formation. Based upon the preliminary results of the Rl, the alluvial aquifer is the only productive aquifer at the Site. During the RI, two wells were extended into the bedrock aquifer. Both wells encountered impermeable shale which yielded essentially no water.

In other areas of Hancock County the two rock units are stated to be hydrologically interconnected and are recharged primarily by percolation of precipitation, with water exchange both vertically and laterally between the Paleozoic and alluvial aquifers. However, this does not appear to be the case at the NSA Site.

Ground water flow at the NSA Site has been modeled using MODFLOW [Modular Three-Dimensional, Finite Difference Ground Water Flow Model (McDonald and Harbaugh, 1988, as amended)]. A thorough description of this modeling effort is described in Technical Memorandum #8, [Treatability Study for Ground Water (Interim Action ROD, Appendix A.4)]. Additional information concerning drilling and monitoring well installation is found in Technical Memorandum #1 (Interim Action ROD, Appendix A.1). This technical memorandum summarizes both drilling and monitoring and monitoring well installation aswell as ground water sampling. Additional information is found in Technical Memorandum #2 which summarizes Ground Water Sampling (Interim Action ROD Appendix A.2), and in Technical Memorandum #7 which summarizes an Aquifer Pump Test (Interim Action ROD. Appendix A.3).

Groundwater flow, as determined by recent well data and the MODFLOW model in the area, is toward the Ohio River. Also, water levels from cluster wells indicate there is an slight upward trend of ground water discharge towards the Ohio River. This information indicates that once contaminants enter the, ground water in the area of the four (4) disposal ponds area, contaminants likely reside and flow ivithin the unconsolidated alluvial aquifer towards the Ohio River where discharge occurs. Based upon RI data, there isno reason to believe that ground waters with cyanide, metals, and fluoride would be able to enter the lower bedrock formation since it is relatively impermeable. It appears that previous monitoring iveils, such as MW204D, encountered the top of this shale layer which now appears to extend several tens of feet below the unconsolidated aquifer.

Information concerning high-flood stage suggests that highwaters will back up and recharge the alluvial aquifer adjacent to the River. Similar conditions were identified during 1989 for typical conditions and in 1990 for flow reversal. However, the significance of this eflect is dependent upon the length and severity of the flooding event. Also, due to the significant accumulation of silts and clays adjacent to the River, it is not likely that the high-stage flooding events would cause reversal of such magnitude that ground water flow would occur at significant distances through the unconsolidated aquifer, then be forced 150 feet downward into the lower bedrock aquifer. The hydraulic gradient is approximately one foot per 1,000 horizontal feet (0.001). The estimated flow velocity for the alluvial aquifer at the Site is approximately two (2) feet per day (Given an assumed porosity for sand and gravel of 30%.).

E.2.6 Surface and Subsurface Features

The plant and its outlying areas are located on a flat floodplain. There is some relief to the west where the topography rises to the River bluff, and some relief to the east near the River where the topography descends to the River’s immediate bank.

In the main plant area, the major source of contamination is the Green Carbon PCB Spill Area. In this area are three (3) pitch tanks and accoutrements which are utilized for the production of the potliners in which the alumina ore is reduced by application of direct electrical current to produce aluminum ingots. New potliners have been stored outside of the plant production building in this area. In the past, the pitch tanks were heated with metal coils filled with hot PCB liquids. Railroad tank cars filled with PCB liquids were driven close to the pitch tanks and the liquid was pumped to holding tanks. Spills of PCB liquids occurred in and around the pitch tank area over a period of years. The facility stopped using PCBs when they were banned for such use by USEPA in the 1970's. Surface and subsurface soils became contaminated with PCBs, in some places to a depth of more than ten (10) feet.

In the northwest part of the Site there are four (4) impoundments or ponds, three (3) of which have been closed by capping and covering. The Old South Slurry Pond has a clay under liner while the two northernmost ponds do not have sophisticated underliners. One impoundment the southernmost one, remains in use for holding APC slurry; this last operating pond is underlined with a thick synthetic material.

To the west of the above-described four (4) impoundments is a low-lying area with several landfills. Most of the landfills are not filled with contaminated material. However, the landfills nearest the four (4) impoundments are known as the Refractory Brick Disposal Areas. In these Disposal Areas there are spent refractory bricks mixed with PCB-contaminated soils from excavations in the main plant area of the NSA facility.

The Taylors Wash Landfill is a deep wash near the River in the northeastern part of the Site, which Nvas used as a debris landfill. A thick, vertical clay barrier was placed at the lowest end of the wash near the River, fill was placed behind the barrier and the landfill was covered with a soil vegetative cover. At the deepest end of the landfill inside the clay barrier there is a standpipe which is used to sample landfill leachate.

Between the main plant and the Taylors Wash Landfill is the PCB Soil Stockpile Area where PCB-contaminated soils and debris from excavations in the main plant area were stored prior to disposal off-site and on-site.

The Drum Storage Area is a gravel-surfaced area to the southeast of the Greeii Carbon PCB Spill Area where drums of various chemicals have been stored. There is at least one small PCB-contaminated area therein.

There are no known areas of archeological or historical importance on or immediately near the Site.

E.2.7 Contaminants of Potential Concern

The following contaminants are found in NSA Site soils, surface waters, and ground waters. While this list does not include every contaminant identified at the Site, it does include contaminants most frequently detected or ones that have been identified in the highest concentrations.

<u>Arsenic:</u> A toxic metallic substance that is a by-product of the smelting process. Inorganic arsenic is recognized as a poison and large oral doses (in food or water) above 60 ppm can cause death. Lower level exposure may cause irritation to the stomach or the intestines, with symptoms such as pain, nausea, vomiting, and diarrhea. Other effects include decrease production of red and white blood cells, abnormal heart rhythm, blood-vessel damage, and impaired nerve function causing a "pins and needles" sensation in your hands and feet. Long-term oral exposure to arsenic can cause significant skin changes including darkening of the skin, corns, warts, and sores. Swallowing arsenic has also been reported to increase the risk of cancer in the liver, bladder, kidney, and lung. The Department of Health and Human Services determined that arsenic is a human carcinogen. Both USEPA and the

National Toxicology Program (NTP) have classified arsenic as a known human carcinogen (ATSDR, TP-92/02, as updated.).

Cyanide: A toxic, colorless solid or substance which is incorporated into carbon potlining material during the aluminum smelting process at the NSA Site. Concentrations of cyanide in on-Site ground waters have been identified at u to 56 ppm (24 ppm amenable or free cyanide) with the MCL for free cyanide species [CN- and HCN] at 0.2 ppm. Concentrations of cyanide may occur up to 2,500 ppm in spent potliners that were disposed in the North Pond prior to July 25, 1986. Exposure to cyanide can cause a wide variety of health problems including: central nervous, respiratory, and cardiovascular system problems. Cyanide or cyanide compounds may cause harmful or fatal effects to those exposed. Exposure to high levels of cyanide for a short time harms the brain, lungs, and heart, and may even cause coma or death (ATSDR, TP-92/09, as updated.). Some of the first indications of cyanide poisoning are rapid deep breathing and shortness of breath, followed by convulsions and loss of consciousness. These symptoms can occur rapidly depending on dose. The health effects of cyanide are similar of no matter if large amounts are eaten, drunk, breathed, or , touched. Skin contact with hydrogen cyanide or cyanide salts can produce skin irritation and sores. While cyanide is extremely toxic at low levels, there are no reports that cyanide can cause cancer in humans or animals. USEPA has determined that cyanide is not classifiable as to its human carcinogenicity (ATSDR, TP-92/09, as updated.).

Barium: A toxic silver-white metallic substance that generally occurs as compounds and is often found in raw ores utilized in the smelting industry. The health effects of the different barium compounds depend upon how well the specific barium compound dissolves in water. Eating or drinking large amounts of barium may cause paralysis or death in a few individuals (ATSDR, TP-91/03). Some people who eat or drink somewhat smaller amounts of barium for a short period may potentially have difficulties in breathing, increased blood pressure, changes in heart rhythm, stomach irritation, minor changes in blood, muscle weakness, changes in nerve reflexes, swelling of the brain, and damage to the liver, kidneys, and spleen. Barium has not been shown to cause cancer in human (ATSDR. TP-91/03. as updated.).

Beryllium: A toxic metallic substance generally associated with raw ores utilized in the smelting or metals machining industry. Beryllium may also be generated through the combustion of coal or fuel oil. Inhalation of beryllium metal can be harmful. Lung damage can occur and significant exposure to beryllium can cause lung damage that resembles pneumonia with reddening or swelling; of the lungs (ATSDR, TP92/04, as updated.). This condition is referred to as acute beryllium disease. Both the short-term, pneumonia-like disease and chronic beryllium disease can be fatal. The International Agency for Research on Cancer has determined that beryllium and beryllium compounds are probably carcinogenic to humans. Beryllium contact with skin that has been scraped or cut can cause rashes or ulcers.

Cadmium: A toxic bluish-white metallic substance that is often a by-product of the smelting industry. Combustion of fossil fuels may also result in the release of cadmium to the environment. Cadmium has no known good effects on your health. Breathing air with very high levels of cadmium severely damages the lungs and can cause death. Breathing lower levels for years leads to a build-up of cadmium in the kidneys that can cause kidney disease. Eating food or drinking water with very high cadmium levels severely irritates the stomach, leading to vomiting and diarrhea (ATSDR, TP92/06, as updated.).

Chromium: In its raw state, chromium is a toxic steel-gray metallic substance found in raw ores commonly utilized in the smelting industry. Another common source of chromium is through the combustion of fossil fuels. Long-term exposure to chromium has been associated with lung cancer in workers exposed to levels in air that were 100 to 1000 times higher than those found in the natural environment. Although chromium (III) in small amounts is an important nutrient needed by the body, swallowing large amounts of chromium (III) may cause health problems. Workers handling liquids or solids that have chromium (IV) in them have developed skin ulcers (ATSDP, TP92/08, as updated.).

Fluoride: A pale-yellow to green substance that at the NSA Site is a by-product of the aluminum smelting process. Fluoride is a by-product of the ionization of cryolite, and is concentrated as a waste product by the air emissions filtration system at the Site. In low concentrations fluoride is not hazardous. However, at elevated levels fluoride may have adverse affects including fluorosis. In the environment, fluorides are soluble and can result in a variety of toxicological effects, including fluorosis, a syndrome resulting from chronic exposure and characterized by bone and tooth damage. Fluoride was found in the ground water adjacent to the North Pond area at levels up to 1,700 ppm (The MCL for fluoride is 4.0 ppm.).

Lead: A toxic bluish-gray metal that at the NSA facility is a by-product of aluminum manufacturing processes. Lead may also be found in paint, solder, and pipes. Children are of special concern because their typical behaviors, like playing outdoors and various hand-to-mouth activities, may result in exposure to soil contamination. While the Site is fenced, it is still possible for children to get on-site where the Old South Pond is located. At this location contaminants are readily exposed. Exposure to lead at elevated concentrations can affect many systems of the body. At lower environmental concentrations, the primary concern is for learning and behavioral effects in young children. The best indicator of lead exposure is lead levels in the blood. Recent studies how that IQ and attention span effects can be correlated with slight increases in blood lead levels. Based on these recent studies, acceptable childhood blood lead levels have been reduced to 10 micrograms of lead Per deciliter of blood (ug/dl).

Manganese: A metallic substance that is commonly combined with other chemicals to form manganese compounds. While eating small amounts of manganese each day is important for maintaining good health, too much manganese can cause serious illness (ATSDR, TP-91/19, as updated.). These compounds are commonly found in ores utilized in the smelting industry. Manganese miners or steel workers exposed to high levels of dust in the air may develop manganism in which the worker may have mental or emotional disturbances with body movements being slow and clumsy. USEPA has determined that manganese is not classifiable as to human carcinogenicity.

Nickel: A toxic silver-colored metal commonly found in ores used in the smelting industry. Small amounts of nickel are essential to good health, too much nickel can be harmful. The Department of Health and Human Services has determined that nickel and certain nickel compounds may reasonably be anticipated to be carcinogens (ATSDR, TP-92/14). Chronic exposure to nickel in nickel refineries or processing plants can cause cancer of the lung and nasal sinuses. Other effects may be of the heart, blood, kidneys, and skin irritations. An increase in deaths from lung diseases occurred in people who breathed in nickel while working at these jobs (ATSDR, TP-92/14, as updated.).

PCBs: PCBs (Polychlorinated biphenyls) are oil-based contaminants that are not readily soluble, can be carcinogenic, do not tend to migrate rapidly, and tend to bioconcentrate. These toxic compounds have been widely used at the NSA Site in transformers, electrical equipment as coolants or lubricants, and as heat transfer fluids. PCB's have been identified at levels at or below 1 mg/kg (ppm) in the media within the Old South Slurry Pond, and at levels as high as 8,000 ppm in subsurface soils in the the Green Carbon PCB Spill Area. While PCBs do not readily partition into the groundwater, they may migrate with dust and other airborne particulates.

Vanadium: Is a natural occurring white to gray metal often found as crystals. This metal also is found in fuel oils and coal. Vanadium pentoxide is in dusts in some factories that use it for making steel. Inhalation of large amounts of vanadium dusts for short or long periods can cause lung, throat, and eye irritations (ATSDR TP-91/29, as updated). Vanadium is not classified as a carcinogen.

E.2.8 Routes of Contaminant Migration

Figure E-1, the Conceptual Site Model, describes the possible routes of contamination migration and transport. Major contamination stems from original soil contamination. From the soil contamination, ground water may become contaminated. From storm water drainage, surface water drainage may cause sediment contamination.

E.2.9 Potential Exposure Targets

Figure E-1, the Conceptual Site Model, and Table G-2, Identification of Exposure Pathways, describe the major exposure pathways available. Potential exposure targets addressed are adult site workers (indoor and outdoor; plant workers and maintenance workers), adult site visitors, and adolescent site visitors.

F. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

F.1 Land Uses

The NSA facility is located in a sparsely populated area approximately four miles northwest of Hawesville, Kentucky. As of 1993, human population near the Site is estimated as follows: within a .25-mile radius, 274; within the zone .25 to .50 mile from the Site, 603; within .5 to 1 mile, 432; within 1 to 2 miles, 4,146; 2 to 3 miles, 2,568; and 3 to 4 miles, 3,788. The majority of the population within these ranges is located across the Ohio River in the State of Indiana.

Prior to 1990, fields at the northern portion of the Site were planted annually in soybeans and sometimes corn. Agricultural use of these fields resumed in the late 1990's. Some of the few private residences to the west of the Site still utilize portions of their property for limited agricultural purposes. An assessment of current land usage adjacent to the Site was conducted during the Remedial Investigation.

The facility itself, as previously described, is an operating alumina ore refining plant and will continue to be utilized for that purpose for the foreseeable future. The proximity of a coal-fired electrical power plant immediately to the northwest of the plant ensures the facility of a relatively inexpensive supply of power for the power-intensive aluminum refining process. Therefore, as long as the NSA facility can produce aluminum ingots at a competitive cost, the facility will operate. The use of the facility for any purpose other than industrial is not currently practical. The Hancock County Airport immediately proximal to the facility also appears to be a permanent fixture as the nearest major airport is in Evansville, Indiana, some distance to the west. Use of the facility property for residential purposes appears remote even in the more distant future.

F.2 Ground and Surface Water Uses

Releases have contaminated the unconsolidated alluvial aquifer at the Site, which is used for industrial processes and was previously used for drinking water for about 1,000 plant employees. NSA found one of the three (3) on-site water supply wells to be contaminated with metals and cyanide at levels just below the Maximum Contaminant Levels (MCLs), and that well is no longer utilized as a source of potable water. The three wells are currently being used only for industrial purposes and pump a maximum of 790,000 gallons per day (550 gallons per minute). Municipal water is now utilized for all potable water at the NSA Site.

The closest residential well is approximately one-half mile south-southeast of the Site. Numerous investigations indicate that contaminants are not migrating toward any of the residential wells. According to the resident, the private well has a total depth of approximately sixty-five (65) feet Within a four-mile radius of the Site, six (6) municipal water companies and several private wells obtain water from the alluvial aquifer, and more than 16,000 people obtain water from these sources. Most of these water consumers live in Tell City and Cannelton, Indiana, across the Ohio River from the Site and are not affected by the ground water contamination at the Site. According to the Kentucky Division of Waste Management Site Investigation Report, in. 1986 there were approximately 1,523 persons utilizing ground water for drinking purposes within three (3) miles of the Site. These people were not served by the municipal water supply. None of these residents live on or near the Site between the sources of contamination and the River. Within the four-mile radius the alluvial aquifer is also used for industrial processes, cattle watering, and commercial food processing.

G. SUMMARY OF SITE RISKS

G.1 Summary of Human Health Risk Assessment

The baseline risk assessment estimates what risks the Site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the Final ROD summarizes the results of the baseline risk assessment for the Site.

G.1.1 Identification of Chemicals of Concern

Table G - 1 presents the chemicals of potential concern (COPCs) and exposure point concentration for each of the COPCs detected in each medium (i.e., the concentration that will be used io estimate the exposure and risk from each COPC in the medium), except for ground water which was addressed in the Interim ROD by the continuous pumping and treating of Site ground waters, and by the KPDES permitting process. The table includes the range of concentrations detected for each COPC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), the exposure point concentration (EPC), and how the EPC was derived. Table G - 1 indicates that polyaromatic hydrocarbons (PAHs) and polychlorinated biplienyls (PCBs) are the most detected COPCs at the Site. The 95 % UCL on the arithmetic mean was used as the exposure point concentration and the maximum concentration detected was used as the default exposure point concentration (i.e., if the 95 % UCL value exceeded the maximum concentration).

G.1.2 Exposure Assessment

The exposure pathways that were quantitatively evaluated in the risk assessment portion of the Remedial Investigation are summarized in Table G - 2. Details are presented in Section 6.0 and Appendix F (Part E) of the Remedial Investigation Report. Figure E - 1, the Conceptual Site Model, presents a flow chart of the potential fate of contaminants originating from contaminant sources. Figure E - 1 begins by describing major potential sources of contamination, that is, 1) disposal areas, 2) surface impoundments, and 3) spills. Each of these three (3) categories umbrella one or more specific Site areas which may affect pathways defined as potential routes of movement of contaminants through primary and secondary affected media to human, fauna, and flora receptors. Chief human receptors are categorized as Site Workers (Adult) and Visitors (Adult and Adolescent). Both a quantitative evaluation and a qualitative evaluation of Site risks were accomplished in the baseline risk assessment. The qualitative evaluation is not set forth herein, but may be found in Appendix F, Part E, Addendum I, of the Remedial Investigation Report. This Final ROD utilized only the quantitative approach to estimate the Site risks to be mitigated by the selected remedy. The baseline risk assessment utilized an industrial use scenario. An assessment based on a residential use scenario was done for comparison purposes.

The NSA baseline risk assessment utilized the following current and future industrial scenario exposures, which have a reasonable likelihood of occurring, in the quantitative evaluation of Site risks.

- Main Processing Area

  Exposures to COPCs in the surface soil by general workers
  Exposures to COPCs in the subsurface soil by construction workers

- External Plant Area

  Exposures to COPCs in the subsurface soils by construction workers
  Exposures to COPCs in the surface soil by visitors
  Exposures to COPCs in the surface water by visitors while wading
  Exposures to COPCs in the sediments by visitors while wading

- Refractory Brick Disposal Area

  Exposure to COPCs in the surface soil by visitors
  Exposure to COPCs in the surface water by visitors while wading
  Exposure to COPCs in the sediments by visitors while wading

Health risks posed by COPCs was determined by the level of exposure (i.e., the magnitude, frequency and duration of exposure) and the toxicity associated with these levels. In the quantitative risk assessment, risk potential posed by COPCs was determined by the following general procedure.

- Estimation of exposure levels

  Exposure levels resulting from various pathways are estimated using equations incorporating parameters to approximate exposure conditions unique to each pathway. A Daily Intake is calculated based upon 1) concentration of COPCs in the environmental medium, 2) the contact rate, 3) the exposure frequency, 4) exposure duration, 5) body weight, and 6) the averaging time (for carcinogenic effects, seventy years; for noncarcinogenic effects, 365 days per year times the exposure duration (4) above).

  For food consumption pathways, such as ingestion of fish (Scenario #7) and ingestion of meat (Scenario #10), the Daily Intake is calculated as above, but including a Transfer Factor, which relates the ratio of chemical concentration in biological tissue to the chemical concentration in environmental media.

- Compilation of Toxicity Data

  Compilation of necessary data from EPA-approved sources such as IRIS and HEAST.

- Characterization of Risk

Noncarcinogenic risk in terms of hazard quotients and hazard indices as described elsewhere herein.

Carcinogenic risk in terms of cancer risk probability as described herein.

G.1.3 Toxicity Assessment

The USEPA has developed toxicity values which reflect the magnitude of the adverse noncarcinogenic and carcinogenic effects from exposure to specific chemicals. Abbreviated descriptions of the development of the toxicity values follow.

G.1.3.1 *Noncarcinogenic* Effects

Chemicals that give rise to toxic endpoints other than cancer and gene mutations are often referred to as "systemic toxicants" because of their effects on the function of various organ systems. Chemicals considered to be carcinogenic can also exhibit systemic toxicity effects. For many noncarcinogenic effects, protective mechanisms (i.e., exposure or dose thresholds) are believed to exist that must be overcome before an adverse effect is manifested. The characteristic distinguishes systemic toxicants from carcinogens and mutagens which are often treated as acting, without a distinct threshold. As a result, a range of exposure exists from zero to some finite value that can be tolerated with essentially no chance of the organism expressing adverse effects. In developing toxicity values for evaluating noncarcinogenic effects, the standard approach is to identify the upper bound of this tolerance range or threshold and to establish the toxicity values based on this threshold.

The toxicity value most often used in evaluating noncarcinogenic effects is a Reference Dose (RfD) for <u>oral or dermal exposure</u> or Reference Concentration (RfC) for <u>inhalation</u> <u>exposure</u>. Various types of RfDs/RfCs; are available. depending on (1) the exposure route of concern (e.g., oral or inhalation), (2) the critical effect of tile chemical (e.g., developmental or other), and (3) the length of exposure being evaluated (e.g., chronic or subchronic).

Reference Doses (RfDs) have been developed by USEPA for indicating the potential for adverse health effects from exposure to contaminants(s) of concern exhibiting noncarcinogenic effects. A chronic RfD/RfC is defined as an estimate of a daily exposure level for the human population that is likely to be without appreciable risk of deleterious effects during a lifetime. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure limits for humans, including sensitive individuals. Estimated intakes of contaminant(s) of concern from environmental media (e.g., the amount of a contaminant(s) of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). Chronic RfDs/RfCs are specifically developed to be protective for long-term exposures, i.e., seven [7] years to a lifetime (seventy [70] years). All exposures, except childhood exposures, in this preliminary risk evaluation are assumed to be long-term. The chronic RfDs/RfCs for the chemicals of concern at this Site are presented in Table G - 3 are derived from USEPA’s Integrated Risk Information System (IRIS), 1991. The oral and inhalation RfDs shown in Table G - 3 are derived, from USEPA’s Health Effects Assessment Summary Tables (HEAST).

Table G - 1 :
Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface and Subsurface Soils

Exposure Point	Chemical of Potential Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Main Processing Area - Surface Soil	Phenanthrene	2.40E-01	7.80E+01	ppm	4/6	7.80E+01	ppm	MAX
	Benzo(a)anthracene	7.80E-02	5.70E+01	ppm	5/6	5.70E+01	ppm	MAX
	Chrysene	4.10E-02	5.60E+01	ppm	6/6	5.60E+01	ppm	MAX
	Benzo(b)fluoranthene	4.40E-02	4.40E+01	ppm	6/6	4.40E+01	ppm	MAX
	Benzo(k)fluoranthene	4.00E-02	3.70E+01	ppm	6/6	3.70E+01	ppm	MAX
	Benzo(a)pyrene	7.80E-02	4.80E+01	ppm	5/6	4.80E+01	ppm	MAX
	Indeno(1,2,3,-d)pyrene	6.80E-02	2.60E+01	ppm	5/6	2.60E+01	ppm	MAX
	Dibenzo(a,h)anthracene	9.00E-02	1.00E+01	ppm	4/6	1.00E+01	ppm	MAX
	Benzo(g,h,i)perylene	8.90E-02	1.80E+01	ppm	5/6	1.80E+01	ppm	MAX
	Arochlor-1248	1.10E-01	1.10E-01	ppm	1/6	9.02E-02	ppm	95% UCL
Green Carbon PCB Spill Area - Subsurface Soil	Aroclor - 1242	2.00E-02	2.80E+03	ppm	20/77	6.02E+00	ppm	95% UCL
	Aroclor - 1248	1.10E+00	9.80E+03	ppm	13/51	1.02E+02	ppm	95% UCL
Main Processing Area (excluding PCB Spill Area) - Subsurface Soil	Phenanthrene	7.90E-02	3.30E+00	ppm	3/8	1.67E+00	ppm	95% UCL
	Benzo(a)anthracene	4.20E-02	2.80E+00	ppm	4/8	2.05E+00	ppm	95% UCL
	Chrysene	4.80E-02	2.90E+00	ppm	4/8	1.98E+00	ppm	95% UCL
	Benzo(b)fluoranthene	4.00E-02	2.40E+00	ppm	4/8	1.86E+00	ppm	95% UCL
	Benzo(k)fluoranthene	4.40E-02	2.90E+00	ppm	4/8	2.14E+00	ppm	95% UCL
	Benzo(a)pyrene	3.60E-02	2.80E+00	ppm	4/8	2.28E+00	ppm	95% UCL
	Indeno(1,2,3-cd)pyrene	7.20E-02	8.80E-01	ppm	3/8	4.58E-01	ppm	95% UCL
	Dibenzo(a,h)anthracene	3.80E-02	2.50E-01	ppm	2/8	2.50E-01	ppm	MAX
	Benzo(g,h,i)perylene	4.60E-02	4.70E-01	ppm	3/8	3.76E-01	ppm	95% UCL
	Aroclor - 1242	4.70E-02	1.20E+00	ppm	3/8	1.20E+00	ppm	MAX
External Plant Area - Surface Soil	Antimony	2.00E-02	4.50E+00	ppm	15/15	4.50E+00	ppm	MAX
	Phenanthrene	8.90E-02	1.00E+01	ppm	7/9	1.00E+01	ppm	MAX
	Benzo(a)anthracene	9.50E-02	8.70E+00	ppm	7/9	8.70E+00	ppm	MAX
	Chrysene	1.50E-01	9.90E+00	ppm	7/9	9.90E+00	ppm	MAX
	Benzo(b)fluoranthene	1.70E-01	1.10E+01	ppm	7/9	1.10E+01	ppm	MAX
	Benzo(k)fluoranthene	9.80E-02	5.70E+00	ppm	7/9	5.70E+00	ppm	MAX
	Benzo(a)pyrene	9.90E-02	9.40E+00	ppm	7/9	9.40E+00	ppm	MAX
	Indeno(1,2,3-cd)pyrene	6.70E-02	5.70E+00	ppm	7/9	5.70E+00	ppm	MAX
	Dibenzo(a,h)anthracene	1.20E-01	3.00E+00	ppm	5/9	1.87E+00	ppm	95% UCL
	Benzo(g,h,i)perylene	7.60E-02	4.10E+00	ppm	6/9	3.15E+00	ppm	95% UCL
	Aroclor - 1242	2.80E-02	8.80E-01	ppm	3/9	8.80E-01	ppm	MAX
	Aroclor - 1248	6.60E-02	4.50E-01	ppm	4/9	4.50E-01	ppm	MAX

Exposure Point	Chemical of Potential Concern	Concentration Detected Min	Concentration Detected Max	Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
External Plant Area - Subsurface Soil	Phenanthrene	1.40E-01	4.50E+00	ppm	3/3	4.50E+00	ppm	MAX
	Benzo(a)anthracene	1.40E-01	7.30E+00	ppm	3/3	7.30E+00	ppm	MAX
	Chrysene	1.50E-01	7.50E+00	ppm	3/3	7.50E+00	ppm	MAX
	Benzo(b)fluoranthene	1.60E-01	7.60E+00	ppm	3/3	7.60E+00	ppm	MAX
	Benzo(k)fluoranthene	1.60E-01	8.20E+00	ppm	3/3	8.20E+00	ppm	MAX
	Benzo(a)pyrene	1.40E-01	8.80E+00	ppm	3/3	8.80E+00	ppm	MAX
	Indeno(1,2,3,-cd)pyrene	5.20E-02	2.70E+00	ppm	3/3	2.70E+00	ppm	MAX
	Dibenzo(a,h)anthracene	7.90E-01	9.50E-01	ppm	2/3	9.50E-01	ppm	MAX
	Benzo(g,h,i)perylene	9.40E-01	1.40E+00	ppm	2/3	1.40E+00	ppm	MAX
	Arochlor - 1242	3.80E-02	2.20E+01	ppm	2/3	2.20E+01	ppm	MAX
	Arochlor - 1248	1.10E+00	1.10E+00	ppm	1/3	1.10E+00	ppm	MAX
Refractory Brick Disposal Areas - Surface Soil	Arsenic	1.80E+00	2.13E+01	ppm	8/8	1.52E+01	ppm	95% UCL
	Cadmium	6.60E-01	1.97E+01	ppm	4/8	1.61E+01	ppm	95% UCL
	Chromium III	6.30E+00	9.20E+01	ppm	8/8	4.80E+01	ppm	95% UCL
	Vanadium	2.16E+0	7.99E+01	ppm	8/8	5.53E+01	ppm	95% UCL
	Phenanthrene	2.00E-01	1.90E+02	ppm	8/8	1.90E+02	ppm	MAX
	Carbazole	1.90E-01	3.60E+01	ppm	7/8	3.60E+01	ppm	MAX
	Fluoranthene	3.90E-01	6.30E+02	ppm	8/8	6.30E+02	ppm	MAX
	Pyrene	2.00E+00	6.00E+02	ppm	7/8	6.00E+02	ppm	MAX
	Benzo(a)anthracene	2.50E-01	4.20E+02	ppm	8/8	4.20E+02	ppm	MAX
	Chrysene	2.70E-01	4.60E+02	ppm	8/8	4.60E+02	ppm	MAX
	Benzo(b)fluoranthene	3.20E-01	6.20E-02	ppm	8/8	6.20E+02	ppm	MAX
	Benzo(k)fluoranthene	2.70E-01	2.90E+02	ppm	8/8	2.90E+02	ppm	MAX
	Benzo(a)pyrene	3.40E-01	5.70E+02	ppm	8/8	5.70E+02	ppm	MAX
	Indeno(1,2,3-cd)pyrene	1.60E-01	3.90E+02	ppm	8/8	3.90E+02	ppm	MAX
	Dibenzo(a,h)anthracene	6.80E-02	1.50E+02	ppm	8/8	1.50E+02	ppm	MAX
	Benzo(g,h,i)perylene	1.50E-01	4.10E+02	ppm	8/8	4.10E+02	ppm	MAX
	Aroclor - 1242	3.60E+00	3.70E+01	ppm	3/8	3.70E+01	ppm	MAX
	Aroclor - 1248	7.40E-02	1.70E+01	ppm	10/16	1.70E+01	ppm	MAX
Refractory Brick Disposal Areas - Subsurface Soil	Beryllium	4.90E-01	2.80E+00	ppm	6/6	2.26E+00	ppm	95% UCL
	Phenanthrene	3.90E-02	1.30E+02	ppm	6/6	1.30E+02	ppm	MAX
	Benzo(a)anthracene	5.40E-02	1.80E+02	ppm	6/6	1.80E+02	ppm	MAX
	Chrysene	5.90E-02	1.90E+02	ppm	6/6	1.90E+02	ppm	MAX
	Benzo(b)fluoranthene	5.20E-02	2.00E+02	ppm	6/6	2.00E+02	ppm	MAX
	Benzo(k)fluoranthene	4.80E-02	1.50E+02	ppm	6/6	1.50E+02	ppm	MAX
	Benzo(a)pyrene	6.50E-02	2.30E+02	ppm	6/6	2.30E+02	ppm	MAX
	Indeno(1,2,3-cd)pyrene	6.60E-02	1.90E+02	ppm	6/6	1.90E+02	ppm	MAX
	Dibenzo(a,h)anthracene	1.00E-01	3.00E+01	ppm	4/6	3.00E+01	ppm	MAX
	Benzo(g,h,i)perylene	1.10E-01	2.20E+02	ppm	6/6	2.20E+02	ppm	MAX
	Aroclor - 1248	1.80E-02	2.40E+01	ppm	9/11	2.40E+01	ppm	MAX

Key:

ppb = parts per billion
ppm = parts per million
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

Table G - 1 (cont'd) :
Summary of Chemicals of Potential Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Drainage Ditch - Sediment	Aluminum	6.10E+03	1.44E+05	ppm	23/23	3.83E+04	ppm	95% UCL
	Antimony	1.50E+00	4.60E+00	ppm	5/23	2.59E+00	ppm	95% UCL
	Arsenic	4.00E-01	5.20E+01	ppm	23/23	1.37E+01	ppm	95% UCL
	Beryllium	6.50E-01	2.82E+01	ppm	23/23	5.45E+00	ppm	95% UCL
	Chromium III	7.90E+00	5.58E+01	ppm	23/23	2.89E+01	ppm	95% UCL
	Iron	6.46E+03	3.53E+04	ppm	23/23	2.63E+04	ppm	95% UCL
	Manganese	5.83E+01	1.24E+03	ppm	23/23	5.89E+02	ppm	95% UCL
	Nickel	1.05E+01	5.65E+02	ppm	23/23	9.65E+01	ppm	95% UCL
	Vanadium	1.57E+01	1.06E+03	ppm	23/23	1.92E+02	ppm	95% UCL
	Fluoride	2.80E+00	5.40E+02	ppm	23/23	3.28E+02	ppm	95% UCL
	Phenanthrene	1.30E-01	4.30E-01	ppm	2/3	4.30E-01	ppm	MAX
	Carbazole	8.50E-02	8.50E-02	ppm	1/3	8.50E-02	ppm	MAX
	Benzo(a)anthracene	2.10E-01	6.90E-01	ppm	2/3	6.90E-01	ppm	MAX
	Chrysene	4.90E-01	2.10E+00	ppm	2/3	210E+00	ppm	MAX
	Benzo(b)fluoranthene	6.20E-01	1.70E+00	ppm	2/3	1.70E+00	ppm	MAX
	Benzo(k)fluoranthene	4.00E-01	9.20E-01	ppm	2/3	9.20E-01	ppm	MAX
	Benzo(a)pyrene	2.50E-01	6.60E-01	ppm	2/3	6.60E-01	ppm	MAX
	Indeno(1,2,3-cd)pyrene	1.90E-01	4.40E-01	ppm	2/3	4.40E-01	ppm	MAX
	Dibenzo(a,h)anthracene	7.40E-02	2.00E-02	ppm	2/3	2.00E-01	ppm	MAX
	Benzo(g,h,i)perylene	1.70E-01	3.40E-01	ppm	2/3	3.40E-01	ppm	MAX
	Aroclor - 1242	5.00E-01	5.70E-01	ppm	2/3	5.70E-01	ppm	MAX
Muddy Gut Tributary - Sediment	Aluminum	8.01E+03	1.84E+04	ppm	6/6	1.82E+04	ppm	95% UCL
	Beryllium	8.00E-01	2.50E+00	ppm	6/6	2.27E+00	ppm	95% UCL
	Iron	2.42E+04	3.78E+04	ppm	6/6	3.30E+04	ppm	95% UCL
	Manganese	1.85E+02	4.87E+02	ppm	6/6	4.84E+02	ppm	95% UCL
	Benzo(g,h,i)perylene	5.50E-02	5.50E-02	ppm	1/6	5.50E-02	ppm	MAX
Ohio River - Sediment	None	N/A	N/A	ppm	None	N/A	ppm	N/A

Key:

ppb = parts per billion
ppm = parts per million
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

Table G - 1 (cont'd) :
Summary of Chemicals of Potential Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Drainage Ditch - Surface Water	Aluminum	1.75E+00	5.43E+00	ppm	4/4	5.43E+00	ppm	MAX
	Arsenic	9.00E-04	2.00E-03	ppm	4/4	2.00E-03	ppm	MAX
	Beryllium	5.10E-03	5.80E-03	ppm	3/4	5.80E-03	ppm	MAX
	Fluoride	6.10E+00	1.40E+01	ppm	4/4	1.40E+01	ppm	MAX
Muddy Gut Tributary - Surface Water	Beryllium	2.00E-03	2.00E-03	ppm	1/2	2.00E-03	ppm	MAX
	Manganese	2.39E-01	7.42E-01	ppm	2/2	7.42E-01	ppm	MAX
	Fluoride	5.00E-01	2.80E+00	ppm	2/2	2.80E+00	ppm	MAX
Ohio River - Surface Water	Aluminum	1.14E+00	8.90E+00	ppm	2/2	8.90E+00	ppm	MAX
	Arsenic	1.40E-03	6.40E-03	ppm	2/2	6.40E-03	ppm	MAX
	Manganese	8.64E-02	1.27E+00	ppm	2/2	1.27E+00	ppm	MAX
	Fluoride	2.00E-01	7.00E-01	ppm	2/2	7.00E-01	ppm	MAX

Key:

ppb = parts per billion
ppm = parts per million
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

TABLE G - 2 :
IDENTIFICATION OF EXPOSURE PATHWAYS

Medium	Land Use : Exposed Population	Evaluation In Preliminary Risk Assessment	Potential Exposure Pathway
Soil	Current and Future Industrial — Indoor Workers	Yes, it is possible for current and future indoor workers to be exposed to chemicals in the surface soil. The potential health impact is expected to be negligible from the risk perspective.	• Inhalation of airborne chemicals from soil • Ingestion of chemicals in soil • Dermal contact with chemicals in soil
	Future Residential — Residents	No, residential land use is not one of the future use alternatives being considered.	• None
	Current and Future Industrial — Maintenance Workers	Yes, it is possible for current and future workers to be exposed to chemicals in the subsurface soil while performing maintenance activities.	• Inhalation of airborne chemicals from soil • Ingestion of chemicals in soil • Dermal contact with chemicals
	Current and Future Industrial — Adolescent and Adult Visitors	Yes, it is possible that Site visitors might be exposed to chemicals in the surface soil.	• Inhalation of airborne chemicals from soil • Ingestion of chemicals in soil • Dermal contact with chemicals in soil
Ground Water	Current and Future Industrial — Workers	No, ground water is only being used on-site for non-contact purposes.	• None
	Current and Future Industrial — Nearby Residents	No, nearby drinking water wells are located upgrdient from the Site.	• None
	Future and Future Industrial — Adolescent and Adult Visitors	No, visitors are not expected to come into contact with ground water.	• None
Surface Water and Sediments	Current and Future Industrial — Workers	No, workers are not expected to come into contact with surface water and sediments.	• None
	Future and Future Industrial — Adolescent and Adult Visitors	Yes, visitors may come into contact with surface water and sediments on-site.	• Ingestion of chemicals in surface water and sediments • Dermal contact with chemicals in surface water and sediments

G.1.3.2 *Carcinogenic Effects*

Carcinogenesis, unlike many noncarcinogenic health effects, is generally thought to be a nonthreshold effect. In other words USEPA assumes that a small number of molecular events can cause changes in a single cell that can lead to uncontrolled cellular growth. This hypothesized mechanism for carcinogenesis is referred to as “nonthreshold”, because there is believed to be essentially no level of exposure to such a chemical that does not pose a finite probability of generating a carcinogenic response.

To evaluate carcinogenic effects, USEPA uses a two-part evaluation in which the chemical is first assigned a weight-of-evidence classification, and then a Carcinogenic Slope Factor (CSF) is calculated. These Indices can be derived for either oral or inhalation exposures. The weight-of-evidence classification is based upon an evaluation of the available data to determine the likelihood that the chemical is a human carcinogen. The following list shows the EPA cancer classes with an explanation of each (based on the EPA 1986 Cancer Guidelines).

USEPA Weight-of-Evidence
Classification System for
Carcinogenicity

Group	Description
A	Human carcinogen
B	Probable human carcinogen
B1	Limited data are available
B2	Sufficient evidence in animals and inadequate or no evidence in humans
C	Possible human carcinogen
D	Not classifiable as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

The Slope Factor(SF) quantitatively defines the relationship between the dose and the response. SFs have been developed by USEPA’s Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminants of concern. SFs, which are expressed in units of (mg/kg-day) are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The Slope Factor is generally expressed as a plausible upper-bound estimate of the probability of response occurring per unit of chemical. The term “upperbound” reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope Factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-animal extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). The Carcinogenic Slope Factors for the chemicals of concern at this site are presented in Table G - 3. These Slope Factors were derived from USEPA’s Health Effects Assessment Summary Tables (HEAST).

These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or IE-06). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

G.1.3.3 *Dermal Exposures*

No RfDs or CSFs have been derived for dermal absorption. Risks associated with dermal exposures may be evaluated with Oral Absorbed Dose RfDs or Oral Absorbed Slope Factors after dermal exposures are converted to their respective absorbed dose. Dermal exposures were adjusted to absorbed dose estimates by assuming that the contaminants permeate skin at chemical-specific permeability rates. Oral RfDs and CSFs were also adjusted by the appropriate oral absorption rate, which gives an Absorbed Dose RfD or Absorbed Dose CSF. The Dermal Absorbed Dose intakes can then be compared to Absorbed Dose toxicity values, as described in the Risk Assessment Guidance for Superfund (RAGS).

G.1.3.4 *Toxicity Assessment Summary*

Slope factors (SFs) have been developed by USEPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminant(s) of concern. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope Factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Reference doses (RfDs) have been developed by USEPA for indicating the potential for adverse health effects from exposure to contaminant(s) of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminant(s) of concern from environmental media (e.g., the amount of a contaminant(s) of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Table G - 3A provides carcinogenic toxicity assessment information which is relevant to the contaminants of concern in both soil and ground water. At this time, slope factors are not available for the dermal route of , exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route.

Table G - 3B provides non-carcinogenic risk information which is relevant to contaminants of concern in both soil and ground water. At least eleven (11) of the COPCs have toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. The chronic toxicity data available for aluminum, antimony, arsenic, benzo(g,h,i)pyrelene, beryllium, cadmium, chromium III, fluoranthene, fluoride, iron, manganese, nickel, phenanthrene, pyrene, and vanadium for oral exposures, have been used to develop oral reference doses (RfDs). As was the case for the carcinogenic data, dermal RfDs can be extrapolated from the oral RfDs applying an adjustment factor as appropriate.

Table G - 3 A : Cancer Toxicity Data Summary						
Pathway : Ingestion, Dermal						
Chemical of Concern	**Oral Cancer Slope Factor**	**Dermal Cancer Slope Factor**	**Slope Factor Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (MM/DD/ YYYY)**
Arsenic	1.50E+00	1.50E+00	(mg/kg-day)-1	A	IRIS	1998
Benzo(a)anthracene	7.30E-01	1.46E+00	(mg/kg-day)1	B2	EOPP	---
Benzo(b)fluoranthene	7.30E-01	1.46E+00	(mg/kg-day)-1	B2	EOPP	---
Benzo(k)fluoranthene	7.30E-02	1.46E+01	(mg/kg-day)-1	B2	EOPP	---
Benzo(a)pyrene	7.30E+00	1.46E+01	(mg/kg-day)-1	B2	IRIS	1998
Beryllium	4.30E+00	2.15E+01	(mg/kg-day)-1	B2	IRIS	1998
Carbazole	2.00E-02	4.00E-02	(mg/kg-day)-1	B2	HEAST	1995
Chrysene	7.30E-03	1.46E-02	(mg/kg-day)-1	B2	EOPP	---
Dibenzo(a,h)anthrancene	7.30E+00	1.46E+01	(mg/kg-day)-1	B2	EOPP	---
Indeno(1,2,3-cd)pyrene	7.30E-01	1.46E+00	(mg/kg-day)-1	B2	EOPP	---
PCBs	medium & mixture specific (a)		(mg/kg-day)-1	B2	IRIS	---

Pathway : Inhalation							
Chemical of Concern	**Unit Risk**	**Units**	**Inhalation Cancer Slope Factor**	**Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (MM/DD/YYYY)**
Arsenic	4.30E-03	(ug/m3))-1	1.50E+01	(mg/kg-day)-1	A	IRIS	1998
Benzo(a)anthracene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	EOPP	—
Benzo(b)fluoranthene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	EOPP	—
Benzo(k)fluoranthene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	EOPP	—
Benzo(g,h,i)perylene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	D	IRIS	1998
Benzo(a)pyrene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	EPA-NCEA	1998
Beryllium	2.40E-03	(ug/m3)-1	8.40E+00	(mg/kg-day)-1	B2	IRIS	1998
Cadmium	1.80E-03	(ug/m3)-1	6.30E+00	(mg/kg-day)-1	B1	IRIS	1998
Chrysene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	EOPP	__
Dibenzo(a,h)anthrancene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	B2	IRIS	1998
Fluoranthene	ND	(ug/m3)-1	ND	(mg/kg-day)-1	D	IRIS	1998
Polychlorinated biphenyls	ND	(ug/m3)-1	Medium-specific (a)	(mg/kg-day-1	B2	IRIS	1998

Key :	**EPA Group :**
--- : No information available. NA : Not Available. ND : Not Determined. IRIS : Integrated Risk Information System, USEPA. EOPP : Estimated Order of Potential Potency. EPA - NCEA : National Center for Exposure Assessment. USEPA. (a) Based on USEPA' document entitles "PCBs: Cancer Dose-Response Assessment Application to Environmental Mixtures (EPA/600/P-96/001F. September 1996) Exposure Upperbound SF Central Tendency SF --- .... Inhalation of dust and aerosol 2 1 Inhalation of vapor 0.4 0.3 Mixtures consist of <0.5 % of congeners with 4 chlorines 0.07 0.04	A - Human carcinogen B1 - Probable human carcinogen - Indicates that limited human data are available B2 - Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans C - Possible human carcinogen D - Not classifiable as a human carcinogen E - Evidence of noncarcinogenicity

Table G - 3 B:
Non-Cancer Toxicity Data Summary

Pathway : Ingestion, Dermal

Chemical of Concern	Chronic/ subchronic	Oral RfD Value	Ora RfD Units	Dermal RfD	Dermal RfD Units	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: TargetOrgan (MM/DD/YYYY)
Aluminum	Chronic Subchronic	1.00E+00 ND	mg/kg-day	5.00E-03 NA	mg/kg-day	100 NA	EPA-NCEA: min. neurotox HEAST: NA	_ 1995
Antimony	Chronic Subchronic	4.00E-04 4.00E-04	mg/kg-day	8.00E-05 8.00E-05	mg/kg-day	1000 1000	IRIS: inc mortality HEAST: inc mortality	1998 1995
Arsenic	Chronic Subchronic	3.00E-04 3.00E-04	mg/kg-day	3.00E-04 3.00E-04	mg/kg-day	3 3	IRIS:hyperpig keratosis HEAST: hyperpig, keratosis	1998 1995
Benzo(g,h,i) pyrelene	Chronic Subchronic	3.00E-02 3.00E-01	mg/kg-day	1.50E-02 1.50E-01	mg/kg-day	NA NA	(a):NA (a):NA	
Beryllium	Chronic Subchronic	5.00E-03 5.00E-03	mg/kg-day	1.00E-03 1.00E-03	mg/kg-day	100 100	IRIS: NO adverse effects HEAST: NO adverse effects	1998 1995

Pathway : Ingestion, Dermal								
Chemical of Concern	**Chronic/ subchronic**	**Oral RfD Value**	**Ora RfD Units**	**Dermal RfD**	**Dermal RfD Units**	**Combined Uncertainty /Modifying Factors**	**Sources of RfD: Target Organ**	**Dates of RfD: TargetOrgan (MM/DD/YYYY)**
Cadmium	Chronic Subchronic	5.00E-04 (Water) 1.00E-03 (Food,soil) NA	mg/kg-day	3.00E-05 (water) 6.00E-05 (Food,soil) NA	mg/kg-day	10 (water) 10(food,soil) NA	IRIS:signif proteinuria IRIS:signif proteinuria HEAST;NA	1998 1998 1995
Chromium (III)	Chronic subchronic	1.00E+00 1.00E+00	mg/kg-day	4.00E-03 4.00E-03	mg/kg-day	1000 1000	IRIS:None observed HEAST;None observed	1998 1995
Chrysene	Chronic Subchronic	ND ND	mg/kg-day	NA NA	mg/kg-day	NA NA	IRIS;NA HEAST;NA	1998 1995
Fluoranthene	Chronic subchronic	4.00E-02 4.00E-01	mg/kg-day	2.00E-02 2.00E-02	mg/kg-day	3000 300	IRIS;Nephro-pathy HEAST; Nephropathy	1998 1995
Fluoride	Chronic Subchronic	6.00E-02 6.00E-02	mg/kg-day	1.20E-02 1.20E-02	mg/kg-day	1 1	IRIS;Fluorosis HEAST; Fluorosis	1998 1995
Iron	Chronic Subchronic	3.00E-01 ND	mg/kg-day	6.00E-02 NA	mg/kg-day	1 NA	EPA-NCEA; Hemo-chromatosis NA:NA	

Pathway : Ingestion, Dermal

Chemical of Concern	Chronic/ subchronic	Oral RfD Value	Ora RfD Units	Dermal RfD	Dermal RfD Units	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: TargetOrgan (MM/DD/YYYY)
Manganese	Chronic Subchronic	7.00E-02 ND	mg/kg-day	1.40E-02 NA	mg/kg-day	NA NA	IRIS(d):NA NA:NA	1998
Nickel (soluble salts)	Chronic Subchronic	2.00E-02 200E-02	mg/kg-day	2.00E-03 2.00E-03	mg/kg-day	300 300	IRIS: decrs'd body weight HEAST: decrs'd bodywt	1998 1995
Phenanthrene	Chronic Subchronic	3.00E-02 3.00E-02	mg/kg-day	1.50E-02	mg/kg-day	NA NA	(a) (a)	
Pyrene	Chronic Subchronic	3.00E-02 3.00E-01	mg/kg-day	1.50E-02 1.50E-01	mg/kg-day	3000 300	IRIS:Kidney HEAST: Kidney	1998 1995
Vanadium	Chronic Subchronic	7.00E-03 7.00E-03	mg/kg-day	7.00E-05 7.00E-05	mg/kg-day	100 100	HEAST:NA HEAST:NA	1995 1995

Pathway : Ingestion, Dermal

Chemical of Concern	Chronic/ subchronic	Oral RfD Value	Ora RfD Units	Dermal RfD	Dermal RfD Units	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: TargetOrgan (MM/DD/YYYY)
Cadmium	Chronic Subchronic	2.00E-04 ND	mg/m3	5.71E-05 ND	mg/kg-day(a)	NANA	(c):NA HEAST:NA	1995
Chromium (III)	Chronic Subchronic	2.00E-04 ND	mg/m3	5.71E-05 ND	mg/kg-day(a)	NA NA	(c):NA NA:NA	

Key:

NA: Not available.
ND: Not determined.
– : No information available.
IRIS: Integrated Risk Information System,USEPA.
HEAST: Health Effect Assessment Summary Tables. USEPA, 1995.
(a) Inhalation RfD = Inhalation RfC x (20m3/day)/70 kg.
(b) RfC for chloroform was not available on IRIS or HEAST. Therefore, oral RfDs were adopted as default inhalation RfDs.
(c) Value presented was withdrawn from HEAST.

G. 1.4 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual=s developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where:

risk = a unitless probability (e.g., 2 x 10^{-5})
CDI = chronic daily intake averaged over 70 years (mg/kg-day); and
SF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10^{-6} or 1 E - 06). An excess lifetime cancer risk of 1 x 10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. This is referred to as an “excess lifetime cancer risk” because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. USEPA’s generally acceptable excess lifetime risk range for site-related exposures is 10^{-4} to 10^{-6}.

Table G - 4A provides carcinogenic risk estimates for the significant routes of exposure. These risk estimates are based upon a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an individual’s exposure to soil and ground water, as well as the toxicity of the COPCs. The total carcinogenic risk from direct exposure to soils and dust at this Site to an Adult Typical Worker is estimated to be 1E-06. The total carcinogenic risk from direct exposure to soil and dust to an Adult Maintenance Worker is estimated to be 8E-06. The total carcinogenic risk from direct exposure to soil, dust, sediment, and surface water to an Adolescent Site Visitor is estimated to be 2E-05. The total carcinogenic risk from direct exposure to soil, dust, sediment, and surface water to an Adult Site Visitor is estimated to be 2E-05. The COPCs contributing most to this risk level are PCBs and PAHs in soil. This risk level indicates that if no clean-up is taken, an individual would have an increased probability of developing cancer as a result of site-related exposure to COPCs based upon reasonable maximum exposures (RMEs) rather than central tendency (CT) data.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ < 1.0 indicates that a receptor’s dose of a single contaminant is less that the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. By adding the HQs for all contaminant(s) of concern that effect the same target organ (e.g., liver) within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. An H1 < 1.0 indicates that, based on the sum of all HQ’s from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI > 1.0 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic Daily Intake
RfD = reference dose; and

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Table G - 4 B provides hazard quotients (HQs) for each assessed route of exposure and the hazard index (or HI, i.e., sum of hazard quotients) for all routes of exposure relative to human health risks for certain potentially affected Site workers and visitors. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) greater than 1.0 indicates the potential for adverse noncancer effects. The HI for the Adult Typical Worker's direct exposure to soil and dust is estimated to be 1E-05 (i.e., HI < 1.0). This level indicates that the potential for adverse noncancer effects from those exposures is slight. The HI for the Adult Maintenance Worker's direct exposure to soil and dust is estimated to be 4E-05 (i.e., HI < 1.0). The HI for the Adolescent Site Visitor's direct exposure to soil, dust, sediment, and surface water is estimated to be 3E-01 (i.e., HI < 1.0). The HI for the Adult Site Visitor's direct exposure to soil, dust, sediment, and surface water is estimated to be 5E-02. The noncancer risk from exposure to contaminated ground water was not evaluated due to the lack of receptor exposure to ground water; the continued use of the public water supply system, and the ground water extraction and treatment system at the NSA facility, effectively eliminates the possibility that individuals will ingest untreated ground water on a regular or chronic basis.

Table H - 1 gives a summary of Site risks by receptor group, contaminants, and Site area. Table H - 2 gives the causative elements for remediation of various Site areas.

Table G - 4A:
Risk Characterization Summary - Carcinogens (RME Scenario)

Scenario Timeframe: Current
Receptor Population: Typical Worker and Maintenance Worker - Industrial Exposure Scenario
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil (and Dust)	Main Processing Area - Adult Typical Worker	Benzo(a)anthracene	9E-08	NA	IE-09	9.1E-09
			Chrysene	9E-10	NA	1E-11	9.1E-10
			Benzo(b)fluoranthene	7E-08	NA	1E-09	7.1E-08
			Benzo(k)fluoranthene	6E-09	NA	8E-11	6.08E-09
			Benzo(a)pyrene	7E-07	NA	1E-08	7.1E-07
			Indeno(1,2,3-cd)pyrene	4E-08	NA	6E-10	4.06E-07
			Dibenzo(a,h)anthracene	2E-07	NA	2E-09	2.02E-07
						Soil Risk Subtotal=	1.12E-06
						Total Adult Typical Worker Carcinogenic Risk=	1E-06

Soil	Soil (and Dust)	Main Processing Area - <u>Adult Maintenance Worker</u>	Benzo(a)anthracene	3E-07	NA	5E-09	3.05E-07
			Chrysene	3E-09	NA	5E-11	3.05E-09
			Benzo(b)fluoanthene	3E-07	NA	5E-09	3.05E-07
			Benzo(k)fluoranthene	3E-08	NA	5E-10	3.05E-08
			Benzo(a)pyrene	3E-06	NA	6E-08	3.06E-06
			Indeno(1,2,3-cd)pyrene	6E-08	NA	1E-09	6.1E-08
			Dibenzo(a,h)anthracene	4E-07	NA	6E-09	4.06E-07
			Aroclor-1242	5E-07	5E-07	9E-10	1E-06
			Aroclor-1248	8E-07	8E-07	1E-09	1.6E-06
						Soil Risk Subtotal=	6.87E-06
Soil	Soil (and Dust)	External Plant Area - <u>Adult Maintenance Worker</u>	Benzo(a)anthracene	2E-08	NA	4E-10	2.04E-08
			Chrysene	2E-10	NA	4E-12	2.04E-10
			Benzo(b)fluroanthene	2E-08	NA	4E-10	2.04E-08
			Benzo(k)fluoranthene	2E-09	NA	4E-11	2.04E-09
			Benzo(a)pyrene	3E-07	NA	4E-09	3.04-07
			Indeno(1,2,3-cd)pyrene	8E-09	NA	1E-10	8.1E-09
			Benzo(a,h)perylene	3E-08	NA	5E-10	3.05E-08
			Aroclor-1242	2E-07	7E-07	3E-10	9.3E-07
			Aroclor-1248	9E-09	4E-08	2E-11	4.9E-08

Soil Risk Subtotal =	1.36E-06
Total Adult Maintenance Worker Carcinogenic Risk =	8E-06

Scenario Timeframe: Current
Receptor Population: Site Visitor
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil (and Dust)	External Plant Area - Adolescennt Site Visitor	Benzo(a)anthracene	8E-09	NA	2E-09	1E-08
			Chrysene	9E-11	NA	3E-11	1.2E-10
			Benzo(b)fluoranthene	1E-08	NA	3E-09	1.3E-08
			Benzo(k)fluoranthene	5E-10	NA	2E-10	7E-10
			Benzo(a)pyrene	9E-08	NA	3E-08	1.2E-07
			Indeno(1,2,3-cd)pyrene	5E-09	NA	2E-09	7E-09
			Dibenzo(a,h)anthracene	2E-08	NA	5E-09	2.5E-08
			Aroclor-1242	2E-09	9E-09	7E-11	1.1E-08
			Aroclor-1248	1E-09	5E-09	3E-11	6.03E-09

		Refractory Brick Disposal Area - Adolescent Site Visitor	Arsenic	6E-08	1E-10	8E-10	6.09E-08
			Cadmium	NA	5E-11	NA	5E-11
			Chromium III	NA	9E-10	NA	9E-10
			Carbazole	2E-09	NA	5E-10	2.5E-09
			Chrysene	9E-09	NA	2E-09	1.1E-08
			Benzo(a)anthracene	8E-07	NA	2E-07	1E-06
			Benzo(b)fluoranthene	1E-06	NA	3E-07	1.3E-06
			Banzo(k)fluoranthene	6E-08	NA	2E-08	8E-08
			Benzo(a)pyrene	1E-05	NA	3E-06	1.3E-05
			Indeno(1, 2, 3-cd)pyrene	7E-07	NA	2E-07	9E-07
			Dibenzo(a, h)anthracene	3E-06	NA	8E-07	3.8E-06
			Aroclor-1242	2E-07	4E-07	5E-09	6.05E-07
			Aroclor-1248	9E-08	2E-07	3E-09	2.93E-07
						Soil Risk Subtotal =	2.1E-05
Sediment	Sediment-Ditch	Refractory Brick Disposal Area - Drainage Disk Adolescent Site Visitor	Arsenic	1E-08	NA	2E-09	1E-08
			Beryllium	1E-08	NA	9E-09	1.9E-08
			Carbazole	9E-08	NA	3E-12	3.9E-08
			Benzo(a)anthracene	3E-10	NA	7E-10	1E-09
			Chysene	8E-12	NA	2E-11	2.8E-11

			Benzo(b)fluoranthene	6E-10	NA	2E-09	2.6E-09
			Benzo(k)fluoranthene	4E-11	NA	1E-10	1.4E-10
			Benzo(a)pyrene	3E-09	NA	7E-09	1E-08
			Indeno(1,2,3-cd)pyrene	2E-10	NA	5E-10	7E-10
			Benzo(a)anthracene	8E-10	NA	2E-09	2.8E-09
			Aroclor-124	3E-08	NA	2E-10	3.02E-08
						Sediment Risk Subtotal =	7.5E-08
Sediment	Sediment - Tributary	Refractory Brick Disposal Area - Muddy Gut Tributary- <u>Adolesent Site Visitor</u>	Beryllium	5E-09	NA	4E-09	9E-09
						Sediment Risk Subtotal =	7.5E-08
Surface Water	Surface Water - Tributary - Ditch - River	Refractory Brick Disposal Area- Muddy Gut Tributary - <u>Adolescent Site Visitor</u>	Beryllium	1E-07	NA	3E-07	4E-07

		External Plant Area - Drainage Ditch Adolescent Site Visitor	Arsenic	5E-08	NA	2E-08	7E-08
			Beryllium	4E-07	NA	8E-07	1.2E-06
		Ohio River - Adolescent Site Visitor	Arsenic	2E-07	NA	6E-08	3E-07
Surface Water Risk Subtotal =							2E-06
Total Adolescent Site Visitor Carcinogenic Risk =							2E-05

Scenario Timeframe: Current
Receptor Population: Site Visitor
Receptor: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Point Total
Soil	Soil (and Dust)	Refractory Brick Disposal Area - Adult Site Visitor	Arsenic	3E-08	8E-11	3E-09	3.3E-08
			Cadmium	NA	3E-11	NA	3E-11
			Chromium III	NA	7E-10	NA	7E-10
			Carbazole	9E-10	NA	2E-09	2.9E-09
			Benzo(a)anthracene	4E-07	NA	7E-07	1.1E-06
			Chrysene	4E-09	NA	7E-09	1.1E-08
			Benzo(b)fluoranthene	6E-07	NA	1E-06	1.6E-06
			Benzo(k)fluoranthene	3E-08	NA	5E-08	8E-08
			Benzo(a)pyrene	5E-06	NA	9E-06	1.4E-05
			Indeno(1, 2, 3-cd) pyrene	4E-07	NA	6E-07	1E-06
			Dibenzo(a, h)anthracene	1E-06	NA	2E-06	3E-06
			Aroclor-1242	9E-08	3E-07	2E-08	4.1E-07
			Aroclor-1248	4E-08	1E-07	1E-09	1.48E-07
						Soil Risk Subtotal =	2.14E-05

Sediment	Sediment - Tributary	Refractory Brick Disposal Area - Muddy Gut Tributary - Adult Site Visitor	Beryllium	2E-09	NA	1E-08	1.2E-08
						Sediment Risk Subtotal =	1.2E-08
Surface Water	Surface Water - River - Tributary -	External Plant Area - Ohio River - Adult Site Visitor	Arsenic	8E-08	NA	4E-08	1.2E-07
		Refractory Brick Disposal Area - Muddy Gut Tributary - Adult Site Visitor	Beryllium	7E-08	NA	2E-07	2.7E-07
						Surface Water Risk Subtotal =	3.9E-07
						Total Adult Site Visitor Carcinogenic Risk =	2E-05

Key

—: Toxicity criteria are not available to quantitatively address this route of exposure.
N/A : Route of exposure is not applicable to this medium.

Table G - 4 B :
Risk Characterization Summary - Non-Carcinogens (RME Scenario)

Scenario Timeframe: Current
Receptor Population: Typical Worker and Maintenance Worker- Industrial Use Scenario
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Critical Effect	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil (And Dust)	Main Processing Area - Adult Typical Worker	Phenanthrene	NA	1E-05	NA	2E-07	1E-05
			Benzo(g,h,i)perylene	NA	3E-06	NA	4E-08	3E-06
Adult Typical Worker Noncarcinogenic Hazard Index =								1E-05
Soil	Soil (and Dust)	Main Processing Area - Adult Maintenance Worker	Phenanthrene	NA	3E-05	NA	4E-07	3E-05
			Benzo(g,h,i)perylene	NA	6E-06	NA	1E-07	6.1E-06
		External Plant Area Adult Maintenance Worker	Acenanpthalene	Kidney	6E-08	NA	NA	6E-08
			Phenanthrene	NA	1E-06	NA	2E-08	1E-06
			Benzo(g,h,i)perylene	NA	4E-07	NA	8E-09	4E-07
Adult Maintenance Worker Noncarcinogenic Hazard Index=								4E-05

Scenario Timeframe: Current
Receptor Population: Site Visitors
Receptor: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Critical Effect	Noncarcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil (and Dust)	External Plant Area Adolescent Site Visitor	Antimony	Increased mortality	1E-04	NA	7E-06	1E-04
			Phenanthrene	NA	3E-06	NA	9E-07	4E-06
			Benzo(g,h,i)perylene	NA	1E-06	NA	3E-07	1E-06
							Soil Risk Subtotal =	1.05E-04
		Refractory Brick Disposal Area - Adolescent Site Visitor	Arsenic	Keratosis	9E-04	NA	1E-04	9.1E-04
			Cadmium	Proteinuria	3E-04	9E-07	1E-04	4E-04
			Chromium III	None Observed	2E-04	3E-04	3E-06	2.03E-04
			Vanadium	NA	1E-04	NA	2E-04	3E-04
			Phenanthrene	NA	1E-04	NA	3E-05	1.3E-04
			Fluoranthene	Nephropathy	3E-04	NA	8E-05	3.8E-04
			Pyrene	Kidney	4E-04	NA	1E-04	5E-04
			Benzo(g,h,i)perylene	NA	2E-04	NA	7E-05	2.7E-04

							Soil Risk Subtotal =	3.09E-03
Surface Water	Surface Water	Refractory Brick Disposal Area - Drainage Ditch - <u>Adolescent Site Visitor</u>	Aluminum	Minimal neurotoxicity	6E-04	NA	5E-02	5.06E-02
			Arsenic	Keratosis	8E-04	NA	3E-04	1.1E-03
			Beryllium	None observed	1E-04	NA	3E-04	4E-04
			Fluoride	Fluorosis	3E-02	NA	5E-02	7E-02
							Surface Water Risk Subtotal =	1.22E-01
		Ohio River - <u>Adolescent Site Visitor</u>	Aluminum	Minimal neurotoxicity	1E-03	NA	8E-02	8.1E-02
			Arsenic	Kerotosis	2E-03	NA	9E-04	2.9E-03
			Manganese	NA	2E-03	NA	4E-03	6E-03
			Fluoride	Fluorosis	1E-03	NA	3E-03	4E-03
							Surface Water Risk Subtotal =	9.39E-02
		Refractory Brick Disposal Area - Muddy Gut Tributary - <u>Adolescent Site Visitor</u>	Beryllium	None observed	9E-05	NA	9E-05	1.8E-04
			Manganese	NA	2E-03	NA	2E-03	4E-03
			Fluoride	Fluorosis	1E-02	NA	1E-02	2E-02
							Surface Water Risk Subtotal =	2.4E-02

Sediment	Sediment	Refractory Brick Disposal Area - Drainage Ditch - Adolescent Site Visitor	Aluminum	Minimal neurotoxicity	1E-04	NA	4E-03	4.1E-03
			Antimony	Increased mortality	2E-05	NA	2E-05	4E-05
			Arsenic	Keratosis	2E-04	NA	2E-05	2.2E-04
			Beryllium	None observed	4E-06	NA	3E-06	7E-06
			Chromium III	None observed	2E-05	NA	3E-05	5E-05
			Iron	Hemochromatosis	3E-04	NA	2E-04	5E-04
			Maganese	NA	3E-05	NA	2E-05	5E-05
			Nickel	Decreased organ weights	2E-05	NA	3E-05	5E-05
			Vanadium	NA	1E-04	NA	1E-03	1.1E-03
			Fluoride	Fluorsis	2E-05	NA	1E-05	3E-05
			Phenanthrene	NA	5E-08	NA	1E-07	1.5E-07
			Benzo(g,h,i)perylene	NA	4E-08	NA	1E-07	1.4E-07
							Sediment Risk Subtotal =	6.1E-03
Sediment	Sediment	Refractory Brick Disposal Area - Muddy Gut Tributary - Adolescent Site Visitor	Aluminum	Minimal neurotoxicity	7E-05	NA	2E-03	2.07E-03
			Beryllium	None observed	2E-06	NA	1E-06	3E-06
			Iron	Hemochromatosis	4E-04	NA	3E-04	7E-04

			Manganese	NA	3E-05	NA	2E-05	5E-05
			Benzo(g,h,i)perylene	NA	7E-09	NA	2E-08	2.7E-08
Sediment Risk Subtotal =								2.8E-03
Adolescent Site Visitor Noncarcinogenic Hazard Index =								3E-01
Scenario Timeframe: Current **Receptor Population:** Site Visitor **Receptor:** Adult								
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Critical Effect**	**Noncarcinogenic Risk**			
					Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Soil	Soil (and Dust)	External Plant Area Adult Site Visitor	Antimony	Increased mortality	2E-05	NA	7E-06	2.7E-05
			Phenanthrene	NA	5E-07	NA	9E-07	1.4E-06
			Benzo(g,h,i)perylene	NA	2E-07	NA	3E-07	5E-07
Soil Risk Subtotal =								2.89E-05
Sediment	Sediment	Refractory Brick Disposal Area - Drainage Ditch - Adult Site Visitor	Aluminum	Minimal neurotoxicity	2E-05	NA	4E-03	4.02E-03
			Antimony	Increased mortality	4E-06	NA	2E-05	2.4E-05
			Arsenic	Keratosis	3E-05	NA	2E-05	5E-05
			Beryllium	None observed	6E-07	NA	3E-06	3.6E-06

			Chromium III	None observed	3E-06	NA	3E-05	3.3E-05
			Iron	Hemochromatosis	5E-06	NA	2E-04	2.5E-05
			Manganese	NA	5E-06	NA	2E-05	2.5E-05
			Nickel	Decreased organ weights	3E-06	NA	2E-05	2.3E-05
			Vanadium	NA	2E-05	NA	1E-03	1.02E-03
			Fluoride	Fluorosis	3E-06	NA	1E-05	1.3E-05
			Phenanthrene	NA	8E-09	NA	1E-07	1.08E-07
			Benzo(g,h,i)perylene	NA	7E-09	NA	1E-07	1.07E-07
Sediment Risk Subtotal =								5.41E-03
Surface Water	Surface Water	Refractory Brick Disposal Area - Drainage Ditch - <u>Adult Site Visitor</u>	Aluminum	Minimal neurotoxicity	1E-04	NA	1E-02	1.02E-02
			Arsenic	Increased mortality	1E-04	NA	7E-05	1.7E-04
			Beryllium	None observed	2E-05	NA	6E-05	8E-05
			Fluoride	Fluorosis	4E-03	NA	1E-02	1.4E-02
Surface Water Risk Subtotal =								2.43E-02
		Ohio River - <u>Adult Site Visitor</u>	Aluminum	Minimal neurotoxicity	2E-04	NA	2E-02	2.02E-02
			Arsenic	Keratosis	4E-04	NA	2E-04	6E-04

			Manganese	NA	3E-04	NA	1E-03	1.4E-03
			Fluoride	Fluorosis	2E-04	NA	6E-04	8E-04
Surface Water Risk Subtotal =								2.24E-02
Adult Site Visitor Noncarcinogenic Hazard Index =								5E-02

Key

— : Toxicity criteria are not available to quantitatively address this route of exposure.
N/A : Route of exposure is not applicable to this medium.

G.2 Summary of Ecological Risk Assessment

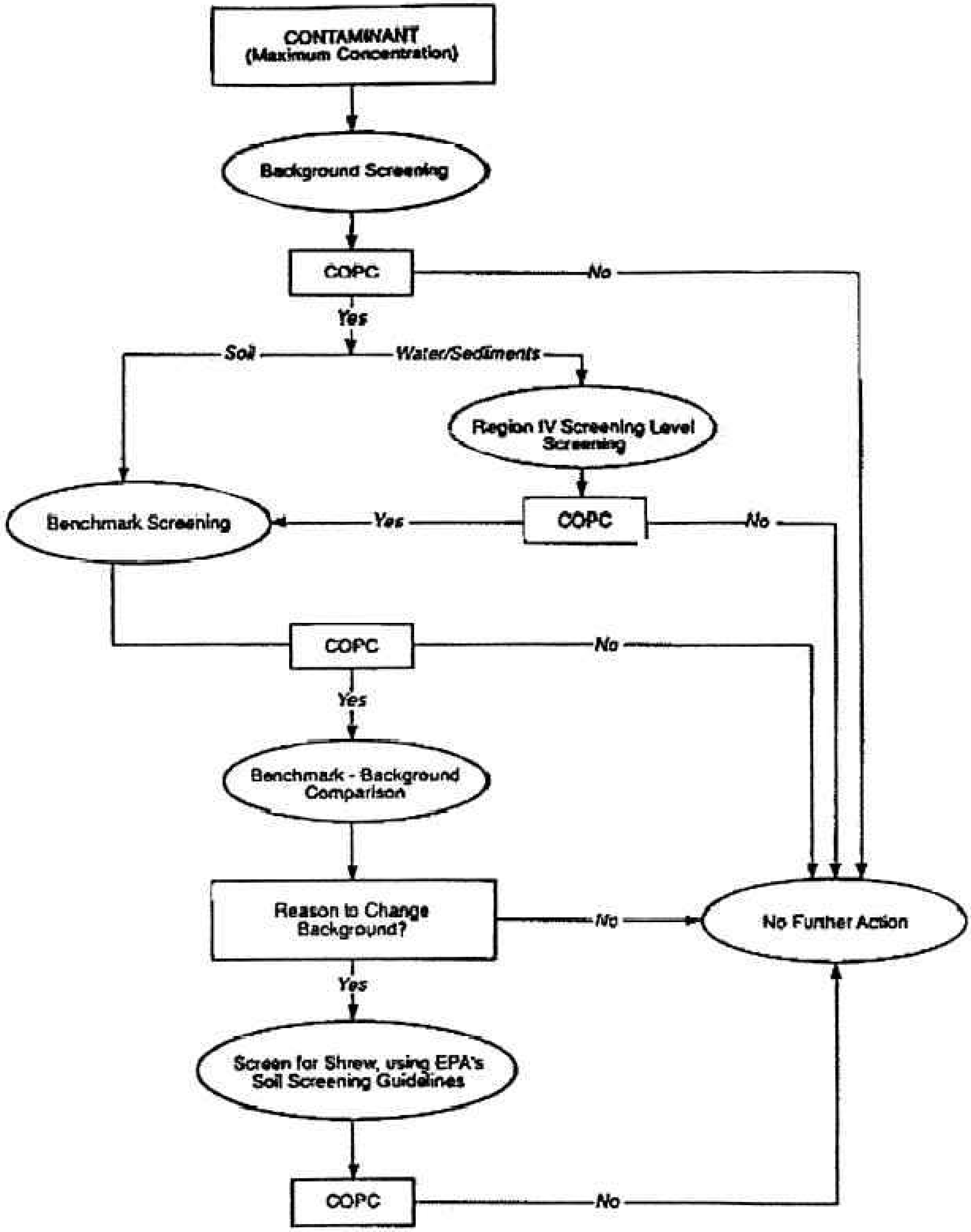
A complete ecological assessment was performed as part of RI/FS. There has not been a site-specific characterization of the wildlife animal population, but the Ohio River floodplain is generally populated by muskrats, beavers, various small vertebrates and invertebrates, songbirds, and waterfowl. The River itself provides habitat for a number of fish and other vertebrates and invertebrates. The bullhead mussel and the orange-footed drive pearly mussel (*Plethobasus cooperianus)* are species of concern. However, no confirmed occurrences of Federal or State threatened or endangered species were found.

Potential ecological receptors present in the vicinity of the Site and potential pathways by which these receptors might be exposed to chemicals of concern present in surface soils, leachate, surface water, and stream sediments were identified. Risks to environment receptors arising from exposure to Site constituents were characterized. Potential receptors are: terrestrial vegetation, terrestrial wildlife, endangered and threatened species, aquatic wildlife, and aquatic vegetation. Any negative impacts on terrestrial flora and fauna by the contaminants of concern are not readily apparent.

G.2.1 Identification of Chemicals of Potential Concern.

The ecological risk assessment procedure that was used in NSA's baseline risk assessment is described in Figure G - 1. The ecorisk assessment data utilized by NSA is found in Section 7 and Appendix F (Part F) of the Remedial investigation Report. Additional ecorisk calculations involving the refinement of ecorisk COPCs for this Final ROD was done by Region IV. The summary data used by Region IV to screen chemicals of potential concern (COPCs) as well as the maximum concentrations for each chemical, the COPCs in each medium, the screening values, the reference database for each chemical constituent, the calculated Hazard Quotient for each chemical constituent, and the, COPC flags are reflected in Table G - 5 below. The Region IV calculations utilized 'alternative screening values' compiled from several different international sources as are described in guidance from the USEPA Region IV, Waste Management Division, Office of Technical Services.

Contaminants which were highlighted by the ecological risk assessment are set forth in Table G - 6. PCBs are being addressed under the TSCA policy-based cleanup standards described in the Selected Remedy section of this Final ROD. Concentrations of PAHs indicate the presence of creosotic compounds which are common at industrial sites. Fluoride ground water contamination is being addressed by means of the ongoing ground water extraction and treatment operation on-site under the Interim ROD and an extant RD/RA Consent Decree. Fluoride in surface soils is not being directly addressed because of its ubiquitous presence at this aluminum refining facility. It seems unlikely that the expenditure of resources on an area-wide sampling and cleanup effort would bring a measureable improvement in ecorisk with regard to metals, However, since there is no physical, documented evidence of impacts on the flora and fauna at the Site, these conclusions will not directly impact the remediation of the Site as described in the Selected Remedy section of this Final ROD.



National Southwire Aluminum Site
Hawesville, Hancock County, KY

Figure G - 1

Ecorisk Assessment Procedure

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Sediments - Drainage Ditch & Muddy Gut Tributary Near Refractory Brick Disposal Areas

Chemical Constituent	Maximum Concentration (mg/kg)	Alternative Screening Value (mg/kg)	Reference	HQ [1]	COPC ? [2]
Aluminum	144000	25500	6	5.65	yes
Arsenic	52	17	6	3.06	yes
Barium	217	200	5	1.09	yes
Beryllium	28.2	0.02	3	1410.00	yes
Cadmium	2.2	3	6	0.73	no
Calcium	73900	N/A		N/A	yes
Chromium	55.8	81	2	0.69	no
Cobalt	26.7	50	3	0.53	no
Copper	48.3	86	6	0.56	no
Cyanide	1.9	5	5	0.38	no
Fluoride	540	N/A		N/A	yes
Iron	37800	188400	6	0.20	no
Lead	83	85	5	0.98	no
Magnesium	5340	N/A		N/A	yes
Manganese	1240	1100	6	1.13	yes

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Sediments - Drainage Ditch & Muddy Gut Tributary Near Refractory Brick Disposal Areas

Chemical Constituent	Maximum Concentration (mg/kg)	Alternative Screening Value (mg/kg)	Reference	HQ [1]	COPC ? [2]
Mercury	0.31	0.56	6	0.55	no
Nickel	565	21	2	26.90	yes
Potassium	7600	N/A		N/A	yes
Selenium	4.1	1	6	4.10	yes
Sodium	4660	N/A		N/A	yes
Thallium	0.5	0.1	3	5.00	yes
Vanadium	0.5	57	6	0.01	no
Zinc	982	150	2	6.55	yes
Acetone	0.012	0.453	3	0.03	no
Carbon disulfide	0.021	0.134	3	0.16	no
Chloroform	0.01	0.027	3	0.78	no
1,1,1-Trichloroethane	0.021	0.17	2	0.12	no
Anthracene	0.13	0.26	6	0.50	no
Benzo(a)anthracene	0.69	0.5	6	1.38	yes
Benzo(a)pyrene	0.66	0.7	6	0.94	no

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Sediments - Drainage Ditch & Muddy Gut Tributary Near Refractory Brick Disposal Areas

Chemical Constituent	Maximum Concentration (mg/kg)	Alternative Screening Value (mg/kg)	Reference	HQ [1]	COPC ? [2]
Benzo(b)fluoranthene	1.7	1.8	6	0.94	no
Benzo(k)fluoranthene	0.92	13.4	6	0.07	no
Benzo(g,h,i)perylene	0.34	0.3	6	1.13	yes
Chrysene	2.1	0.8	6	2.63	yes
Dibenzo(a,h)anthracene	0.2	0.1	6	2.00	yes
Fluoranthene	4.6	1.5	6	3.07	yes
Fluorene	0.1	0.3	6	0.33	no
Indeno(1,2,3-cd)pyrene	0.44	0.33	6	1.33	yes
Phenanthrene	0.43	0.8	6	0.54	no
Pyrene	1.6	1	6	1.60	yes
Total PAHs	13.91	12	6	1.16	yes
Carbazole	0.085	N/A		N/A	yes
Bis(2-ethylhexyl)phthalate	0.47	1.3	4	0.36	no
Di-n-butylphthalate	0.35	11	1	0.03	no
2-Methylnaphthalene	0.68	0.07	4	9.71	yes

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Sediments - Drainage Ditch & Muddy Gut Tributary Near Refractory Brick Disposal Areas

Chemical Constituent	Maximum Concentration (mg/kg)	Alternative Screening Value (mg/kg)	Reference	HQ [1]	COPC ? [2]
Phenol	0.084	0.42	4	0.20	no
Methoxychlor	0.022	0.019	1	1.16	yes
PCB-1242	0.57	0.033	1	17.27	yes
PCB-1248	0.025	0.033	1	0.76	no
PCB-1254	0.068	0.06	1	1.13	yes

Notes: Bis(2-ethylhexyl)phthalate screening value used for all phthalates.
N/A = not available
1 - Hazard Quotient
2 - Chemical of Potential Concern

Reference: 1 - Friday 1998
2 - USEPA 1996 (Ecotox Threshold, Eco Update)
3 - USEPA 1999 (Region 5 draft Ecological Screening Levels)
4 - USEPA 1995 (Region 3 draft BTAG Screening Levels)
5 - MHSPE 1994
6 - Buchman 1999 (NOAA SquiRT).
Values are UETs, except aluminum (TEL) and iron (TEL).

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Water - Muddy Gut Creek Downgradient From Refractory Brick Disposal Areas & Ohio River Near KPDES-Permitted Outfall

Chemical Constituent	Maximum Detected Concentration (mg/L)	Alternative Screening Value (mg/kL)	Protective for Organism, if known	Reference	HQ [1]	COPC ? [2]
Aluminum	8.9	0.46	all	3	19.35	yes
Barium	0.167	0.0039		2	42.82	yes
Beryllium	0.0058	0.0076		5	0.76	no
Cadmium	0.0037 J	0.001		2	3.70	yes
Calcium	46.5	116	all	3	0.40	no
Cobalt	0.0145 J	0.023		1	0.63	no
Copper	0.0245 J	0.011		2	2.23	yes
Fluoride	14	2.7		4	5.19	yes
Lead	0.0338	0.0123	all	3	2.75	yes
Magnesium	13.3	82		1	0.19	no
Manganese	1.27	1.78	fish	3	0.71	no
Mercury	0.0002 U	0.0013		2	0.15	no
Potassium	6.66	53		1	0.13	no
Silver	0.005 U	0.001		5	5.00	yes
Sodium	43.9	680		1	0.06	no

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Water - Muddy Gut Creek Downgradient From Refractory Brick Disposal Areas & Ohio River Near KPDES-Permitted Outfall

Chemical Constituent	Maximum Detected Concentration (mg/L)	Alternative Screening Value (mg/kL)	Protective for Organism, if known	Reference	HQ [1]	COPC ? [2]
Vanadium	0.0096 J	0.02		1	0.48	no
Zinc	0.411	0.1		2	4.11	yes
Cyanide	0.023	0.0078	all	3	2.95	yes
Bis(2-ethylhexyl)phthalate	0.01 U	0.032		2	0.31	no

Notes: 1 = Hazard Quotient
2 = Chemical of Potential Concern

References: 1 - Friday 1998
2 - USEPA 1996 (Ecotox Thresholds, ECO Update)
3 - Suter and Tsao 1996
4 - USEPA 1995 (Region 3 draft BTAG Screening Levels)
5 - USEPA 1999 (Region 5 draft Ecological Screening Values)

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Soils (0 - 6 inches) - External Plant Area & Refractory Brick Disposal Area(s)

Chemical Constituent	Maximum Concentration (mg/kg)	2 X Average Background (mg/kg) or Detection Frequency	Alternative Soil Screening Value (mg/kg)	Reference	HQ *	COPC ? [1]
Aluminum	45200	25115	600	5	1.8	yes
Antimony	5.4	2.1025	5	6	1.1	yes
Arsenic	21.3	14.3	29	4	0.7	no
Beryllium	7.9	1.88	10	6	0.8	no
Cadmium	19.7	1.32375	20	5	1.0	no
Calcium	322000	109280.75			2.9	yes
Chromium	92	36.7	100	4	0.9	no
Copper	126	35.075	130	1	1.0	no
Fluoride	300	19.325	1	3	15.5	yes
Iron	52100	45472.5	200	5	260.5	yes
Lead	177	44.85	200	8	0.9	no
Magnesium	25400	7952.5	440000	3	0.1	no
Manganese	1300	1889.5	100	5	0.7	no c<bkg
Mercury	0.27	0.18375	0.3	4	0.9	no
Nickel	89.4	47.875	100	8	0.9	no

Table G - 5 :
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Soils (0 - 6 inches) - External Plant Area & Refractory Brick Disposal Area(s)

Chemical Constituent	Maximum Concentration (mg/kg)	2 X Average Background (mg/kg) or Detection Frequency	Alternative Soil Screening Value (mg/kg)	Reference	HQ *	COPC ? [1]
Potassium	2820	3319			0.8	no v<bkg
Selenium	0.86	1.12				no c<bkg
Sodium	1090	215.1			5.1	yes
Vanadium	135	47.2	130	2	1.0	yes
Zinc	282	21.0225	300	1	0.9	no
Cyanide	6.4		10	8	0.6	no
Acetone	0.019	6/29	2.5	7	0.0	no
Chloroform	1.3 U	0/29	1.19	7	1.1	yes
Bromodichloromethane	1.3 U	0/29	450	3	0.0	no
4-Methyl-2-pentanone	1.2 J	1/29				no <5 %
1,1,1-Trichloroethane	0.11	14/29	0.3	3	0.4	no
Acenaphthene	28	15/29	0.1	3	280.0	yes
Acenaphthylene	92 U	0/29	0.1	3	920.0	yes
Anthracene	47	22/29	148	7	0.3	no
Benzo(a)anthracene	420	27/29	5.21	7	80.6	yes

Table G - 5:
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Soils (0 - 6 inches) - External Plant Area & Refractory Brick Disposal Area(s)

Chemical Constituent	Maximum Concentration (mg/kg)	2 X Average Background (mg/kg) or Detection Frequency	Alternative Soil Screening Value (mg/kg)	Reference	HQ *	COPC ? [1]
Benzo(a)pyrene	570	26/29	1.52	7	375.0	yes
Benzo(b)fluoranthene	620	25/29	59.8	7	10.4	yes
Benzo(k)fluoranthene	290	28/29	148	7	2.0	yes
Benzo(g,h,i)perylene	410	28/29	119	7	3.4	yes
Chrysene	460	28/29	4.73	7	97.3	yes
Dibenzo(a,h)anthracene	150	24/29	18.4	7	8.2	yes
Fluoranthene	630	28/29	122	7	5.2	yes
Indeno(1,2,3-cd)pyrene	390	27/29	109	7	3.6	yes
2-Methylnaphthalene	92 U	0/29	3.24	3	28.4	yes
Naphthalene	0.11 J	1/29	0.1	3		no < 5 %
Phenanthrene	190	24/29	45.7	7	4.2	yes
Pyrene	600	26/29	78.5	7	7.6	yes
Total PAHs	4989.11		50	1	99.8	yes
Butylbenzylphthalate	92 U	0/29	0.239	7	384.9	yes
Carbazole	36 J	19/29			N/A	yes

Table G - 5:
Refinement of List of Chemicals of Potential Concern (COPCs)

Exposure Medium: Surface Soils (0 - 6 inches) - External Plant Area & Refractory Brick Disposal Area(s)

Chemical Constituent	Maximum Concentration (mg/kg)	2 X Average Background (mg/kg) or Detection Frequency	Alternative Soil Screening Value (mg/kg)	Reference	HQ *	COPC ? [1]
Dibenzofuran	6.9 J	5/29			N/A	yes
Di-n-butylphthalate	0.57 J	14/29	200	6	0.0	no
Diethylphthalate	0.3 J	10/29	24.8	7	0.0	no
4-Methylphenol	92 U	0/29	1	8	92.0	yes
Pentachlorophenol	0.19 J	1/29	7.6	2	0.0	no < 5 %
Phenol	0.1 J	5/29	3.8	2	0.0	no
Methoxychlor	0.38 U	0/29	0.5	8	0.8	no
PCB-1242	37	6/29	0.3	2	123.3	yes
PCB-1248	10	14/29	0.3	2	33.3	yes
PCB-1254	0.073	7/29	0.3	2	0.2	no

Notes: * HQ calculated if alternative screening value is available. If eliminated based on back-ground, "c<bkg" will show. If based on detection frequency, "< 5" will show.

1 - COC = Chemical of Potential Concern

References:

1 - British guidelines, ICRCL 59/83 list. URL: http://www.contaminatedland.co.uk/std-guid/icrcl-1.htm
2 - Canadian Soil Quality Guidelines. URL: www.ec.gc.ca/ceqg-reqe/soil.htm
3 - USEPA 1995 (Region 3 draft BTAG Screening Levels
4 - MHSPE 1994
5 - Efroymson et al 1997a
6 - Efroymson et al 1997b
7 - USEPA 1999 (Region 5 draft Ecological Screening Values)
8 - Beyer 1990

Table G - 6:
Final Ecological Chemicals of Potential Concern (COPCs)

Chemical Constituent	Surface Soil	Sediment	Surface Water
Aluminum	X	X	X
Antimony	X		
Arsenic		X	
Barium		X	X
Beryllium		X	
Cadmium			X
Calcium	X	X	
Copper			X
Fluoride	X	X	X
Iron	X		
Lead			X
Magnesium		X	
Manganese		X	
Nickel		X	
Potassium		X	
Selenium		X	
Silver			X

Table G - 6:
Final Ecological Chemicals of Potential Concern (COPCs)

Chemical Constituent	Surface Soil	Sediment	Surface Water
Sodium	X	X	
Thallium		X	
Vanadium	X		
Zinc		X	X
Cyanide			X
Acetone			
Chloroform	X		
Acenaphthene	X		
Acenaphthylene	X		
Benzo(a)anthracene	X	X	
Benzo(a)pyrene	X		
Benzo(b)fluoranthene	X		
Benzo(k)fluoranthene	X		
Benzo(g,h,i)perylene	X	X	
Chrysene	X	X	
Dibenzo(a,h)anthracene	X	X	
Fluoranthene	X	X	

Table G - 6:
Final Ecological Chemicals of Potential Concern (COPCs)

Chemical Constituent	Surface Soil	Sediment	Surface Water
Indeno(1,2,3-cd)pyrene	X	X	
2-Methylnaphthalene	X	X	
Phenanthrene	X		
Pyrene	X	X	
Total PAHs	X	X	
Butylbenzylphthalate	X		
Carbazole	X	X	
Dibenzofuran	X		
4-Methylphenol	X		
Methoxychlor		X	
PCB-1242	X	X	
PCB-1248	X		
PCB-1254		X	

G.2.2 Exposure Assessment

Southwire Company owns approximately 900 acres, but the affected area associated with the Plant and facilities is more than 400 acres. For the purpose of the NSA ecological assessment, the Site was divided into three (3) areas: (1) the Main Processing Area (Main Plant Area); (2) the External Plant Area (includes the Taylors Wash Landfill and the PCB Soil Stockpile Area), and (3) the Refractory Brick Disposal Areas. Reasons for this division included the distinct ecology of the three areas, differences in exposure characteristics, and the geographical and physical separation of the areas. The Main Processing Area is almost not vegetated and therefore not included in the habitat and ecological risk assessment. The ecological evaluation focused on the External Plant Area and the Refractory Brick Disposal Areas. The evaluation included Taylors Wash Landfill, the PCB Soil Stockpile Area, the Tributary to Muddy Gut Creek and the Creek, the Drainage Ditch, and the Ohio River.

Historically, much of the land in the vicinity of the Site was cleared for farming. Some of the farmland is abandoned and the vegetative communities are being replaced by early successional deciduous woody growth. Other sections in the Site's vicinity were developed by industries or for farming (Crops cultivated in 1998-1999 were soy beans and corn.). Three dominant vegetation types occur at the Site: (1) riparian vegetation; (2) oldfield vegetation, and (3) cropland. The oldfield vegetation type can be further divided into regular oldfield, disturbed oldfield, and maintained oldfield. Human disturbance is the reason for the differences among the sites. Disturbed oldfields, are located in the Refractory Brick Disposal Areas and the PCB Soil Stockpile Area. Maintained oldfield areas are typically inowed, reducing the invasion of woody species. The Muddy Gut property had previously been planted with soybeans and corn. This area has since been designated as a habitat conservation area and the vegetation will rapidly develop into an oldfield vegetation type.

Terrestrial wildlife inhabiting the Site include resident and migratory birds, invertebrates, amphibians, and mammals. Mammals observed on-site or in proximity to the Site included the eastern cottontail, the woodchuck, Eastern gray squirrel, Eastern fox squirrel, beaver, muskrat, red fox, gray fox, raccoon, mink, and white-tailed deer. The Kentucky Department of Fish and Wildlife database indicated that at least seven (7) other mammals are known to reside, breed, or winter in Hancock County.

The KDFW database also listed 33 avian species that reside, breed, or winter in Hanock County. Game birds found in proximity to the Site include: mourning doves, bobwhite quail, ruffed grouse, wild turkey, ducks, and geese.

Ten (10) species of salamanders, frogs, lizards, and snakes were listed by the KDFW as known to reside in Hancock County. These species include: small mouth salamander, slimy salamander, striped chorus frog, bull frog, green frog, southern leopard frog, eastern fence lizard, worm snake, rough green snake, and the common garter snake.

Riparian species are likely to be the most diverse on the Site, and wildlife use of the vegetation is extensive. Species include: deer, squirrel, raccoon, opossum, beaver, muskrat, skunk, and rabbit. Avian species observed in the riparian habitats include the mourning dove, blue jays, Northern flicker, tufted titmouse, chickadee, Northern cardinal, American robin, chipping sparrow, and finches. Birds observed in oldfield and disturbed oldfield habitats included the red-tailed, hawk, woodpeckers, Northern flicker. American robin, sparrows and finches. Birds seen in the cropland areas included doves, crows, grackles, red-winged blackbirds, starlings, American robins, and sparrows.

Aquatic and wetland habitats consist of water bodies associated with the Ohio River, intermittent streams, and drainage ditches, and surface impoundments. Surface drainage on-site generally flows north, following an old Ohio River meander scar. Several wetland types were identified at die Site using U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and ground-truthing. Wetland types, according to the U.S Army Corps of Engineers' definition, include: palustrine forested; palustrine strub/sluub; palustrine unconsolidated bottom; palustrine unconsolidated shore; and riverine.

The Site drainages do not provide a suitable habitat for fisheries. Fish communities may exist in excavation ponds located in the northern section of the Muddy Gut property. The Ohio River provides suitable habitat for aquatic invertebrates, and at least 34 species of sport fish, although fishing advisories limiting consumption of certain fish species have been imposed by regulatory agencies from time to time. Mussel beds have in the past been located on the opposite bank of the Ohio River in Indiana about one mile upstream and two miles downstream of the Site.

The KSNPC has no records of endangered or threatened species on or adjacent to the Site, or within five River miles downstream, except for the orange-footed pearly mussel, which was noted prior to 1970. The KDFW records do not indicate that the orange-footed pearly mussel occurs withiq the County, and the KSNPC has no records of the species occurring within the area after 1970. According to the KSNPC and die USFWS, the blue sucker may occur close to the Site area. The KDFW database for Hancock County noted fifteen (15) Federal- or State-protected species residing within the County.

- gray bat (Myotis grisescens) - Federal and State endangered
- Indiana bat (Myotis sodalis) - Federal and State endangered
- eastern small-footed myotis (Myotis leibi) -
- evening bat (Nycticeius humeralis) - State-endangered
- Rafinesque big-eared bat (Plecotus rafinesquii) - State-endangered
- pygmy shrew (Sorex hoyi) - Federal candidate
- eastern spotted skunk (Spilogale putorius) - State-endangered
- bald eagle (Haliaeetus leucocephalus) - Federal and State-endangered
- bank swallow (Riparia riparia) - State special concern species
- rose-breasted grosbeak (Pheucticus ludovicianus) - State special concern species
- Kirtland's snake (Clonophis kirtlandi) - State-endangered
- Copperbelly watersnake (Nerodia erythrogaster negglecta) - State-endangered Alabama
- Alabama shad (Alosa alabamae) - State-endangered
- blue sucker (Cycleptus elongatus) - Federal candidate
- Johnny Darter (Etheostoma nigrum) - Federal candidate and State-endangered

However, no observations of these species within the study area exist in the KSNPC database as of 1998, and none of the fish species were observed during field studies. No additional Federal- or State-protected species are known to reside in the area of Indiana adjacent to the Site.

G.2.3 Ecological Effects Assessment

No Site-specific toxicity tests (e.g., macroinvertebrate studies, aquatic, soil and/or sediment toxicity studies) were used to evaluate adverse ecological effects. The Region IV ecorisk evaluation built upon the substantial body of ecorisk done by NSA and compared the maximum detected concentration of contaminants against (1) two times the background level; (2) EPA Region IV alternative screening levels (where available); and (3) benchmark levels for various target organisms. Ecological exposure pathways of concern are described in Table G - 7.

G.2.4 Ecological Risk Characterization

Sources of uncertainty in the determination of the ecological qualitative risk assessment included:

(a) confidence that all key contaminants were identified and quantified accurately;
(b) dependence on toxicity data which are the foundation for all health-based ARARs and which are based on animal experiments and epidemiological study groups;
(c) confidence in the identification of all exposure parameters and exposure pathways appropriate to the site;
(d) uncertainty in the comparison of site concentrations to ARARs by which additive effects may be overlooked;
(e) confidence in the identification and characterization of the exposed populations, both current and future, and the land use, both current and future;
(f) qualitative risk assessments which rely on background concentrations and chemical-specific ARARs are somewhat limited in that they cannot account for cumulative toxic effects from several chemicals or several exposure routes; and
(g) the imprecision of present scientific data on exactly what constituent concentrations pose a hazard to environmental receptors.

The NSA ecological risk assessment indicates that there were few apparent adverse ecological effects associated with the contamination at the Site. This conclusion is based upon the following technical and ecological points, and consideration of the performance of the entire ecosystem at the Site:

- The biota found at the Site do not appear to be affected by any inorganic compounds of potential concern with the possible exception of fluoride. Fluoride toxicity determination and screening values were conservative. Screening values were based on research with sodium fluoride, which is very soluble. NSA collects forage samples for fluoride as part of its air monitoring permit, thus, this chemical is closely monitored.
- Organic compounds of potential concern included benzo(a)pyrene and other PAHs, and PCBs such as Aroclor-1242 and Aroclor-1248. Significant areas of contamination by these organics is localized in areas of old spills and in areas of disposal of excavated soils. The sampling data demonstrated that, on average, these organics were detected in approximately two-thirds of the samples.. Sampling areas were planned in such a way as to concentrate on areas of known spillage and disposal, and 100 % detection should have been expected. Significant contamination appeared to be located in a few small areas. Photographs and Site visits indicated that the External Plan Area may not receive much long-term use by animals and that animals that enter the Site are mostly occasional visitors. This conclusion is based upon the lack of cover and perches in the study area. Animals that visit the External Plant Area may receive only a small dose that is proportional to the time spent on-site. Many mammals and birds have large territories and overall exposure at one site could thus be expected to be very low.

Table G - 6
Ecological Exposure Pathways of Concern

Exposure Medium	Sensitive Environment Flag (Y or N)	Receptor	Endangered Threatened Species Flag (Y or N)	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Sediment	Y	- Benthic organisms	N	- Ingestion, respiration, and direct contact with chemicals in sediment	- Benthic invertebrate community species diversity and abundance	- Toxicity of soil to *Hyallela* - Species diversity index
Surface Water	Y	- Fish	N	- Ingestion, respiration, and direct contact with chemicals in surface water	- Maintenance of an abundant and productive game fish population	- Toxicity of surface water to *Pimephales promelas* - Species diversity index
Surface Soil	Y	-Terrestrial invertebrates - Terrestrial plants	N	- Ingestion and direct contact w/ chemicals in wetland soils - Uptake of chemicals via root systems	- Survival of terrestrial invertebrate community - Maintenance /enhancement of native wetland vegetation	- Toxicity of sediments to *Lumbricus terrestris* - Species diversity index - Survival of seedings
Subsurface Soil	N	- Terrestrial invertebrates - Terrestrial plants	N	- Ingestion and direct contact w/ chemicals in wetland soils - Uptake of chemicals via root systems	- Maintenance /enhancement of native wetland vegetation	- Species diversity index - Survival of seedings

- The External Plant Areas and Refractory Brick Disposal Areas are composed of a diverse conglomerate of ecosystems, soils, and biota. Resident animals are likely to have a varied diet from areas of variable contaminant concentrations and bioavailability. The areas within the Refractory Brick Disposal Areas where contaminants were more significant 'hotspots' made up approximately two per cent of the entire study area (i.e., 10 acres of more than 400), so total exposure to any one 'hotspot' could be expected to be low. The likelihood that the majority of individuals in an entire on-site population would be exposed to significant concentrations of the COPCs appears to be very low.
- Field reconnaissance indicated that the ecosystem at the Site is very resilient. Vegetation is growing vigorously and appears to have its natural diversity. Some wildlife and wildlife tracks were observed. No endangered species were observed at the Site during the field reconnaissance.

G.3 Basis for Action and Summary.

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this Final Record of Decision may present a continuing imminent and substantial endangerment to public health, welfare, or the environment. The response action selected in this Final ROD is necessary to protect the public health or welfare or the environment from actual or threatened. releases of hazardous substances into the environment.

H. REMEDIAL ACTION OBJECTIVES.

This section presents a summary of the issues and areas of concern that have been identified at the Site, the remedial objectives for the Site, and the general response actions that were selected for evaluation in the FS.

H.1 Description of RAOs.

In order to define the Remedial Action Obiectives for the Site, seven (7) areas of concern have been selected based upon results of the RI and its Baseline Risk Assessment (BRA) and Ecological Risk Assessment (ERA). The seven (7) areas of concern are as follows.

1. Green Carbon PCB Spill Area
2. Refractory Brick Disposal Area (s)
3. Taylors Wash
4. Drum Storage Area
5. PCB Soil Stockpile Area
6. Site-wide Groundwater
7. South Pond Closure / Post Closure

Based on the potential pathways that have been identified for the seven (7) areas of concern, the general Remedial Action Objectives (RAOs) for the NSA site are as follows:

! Minimize direct contact by Site workers and the public with soil containing excessive levels of total PCBs.

! Minimize direct contact by Site workers and the public with soil containing excessive levels of PAH compounds.

- Minimize transport of contaminated soil by erosion to water courses, including the Ohio River.

- Minimize potential for leaching of total PCBs and PAHs to Site groundwater from areas of high concentrations.

- Remediate groundwater contaminated with elevated levels of cyanide and fluoride.

- Prevent deterioration of Old South Slurry Pond containment system.

The following subsections present area-specific RAOs for each of the areas of concern. This FS evaluated remedial alternatives that will either remove or isolate the contaminants, or break the pathway between the contaminants and receptors.

1. Refractory Brick Disposal Area(s).
    - Reduce risk of direct contact by public or Site workers with contaminants in surface soils resulting in ingestion or dermal absorption.
    - Reduce risk of ingestion or bioaccumulation of contaminants in surface soils by fauna.
    - Reduce risk of transport of contaminated soils to surface waters via runoff.
2. Green Carbon PCB Spill Area.
    - Reduce risk of direct contact by Site workers, particularly during subsurface maintenance of utilities, or construction, resulting in ingestion or dermal absorption.
    - Reduce risk of transport of contaminated soils to surface waters via runoff.
    - Reduce risk of contributions of contaminants to groundwater via infiltrating precipitation.
3. PCB Soil Stockpile Area.
    - Reduce risk of direct contact with contaminants by Site workers or visitors.
4. Drum Storage Area.
    - Reduce risk of direct contact with contaminants by Site workers resulting in ingestion or dermal absorption.
5. Taylors Wash Landfill (leachate).
    - Reduce potential for contaminated leachate to migrate to groundwater or surface water.
6. Site-Wide Ground Water.
    - Ensure continued groundwater restoration.
7. Old South Slurry Pond.
    - Ensure continued maintenance of the containment system.

H.2 Rationale for RAOs and How RAOs Address Risks.

The RI identified the distribution and concentrations of contaminants at the Site, including PCBs and carbon and pitch-related SVOCs (e.g., PAHs). The BRA and ERA evaluated these data to develop a current, sitc-specific estimate of human health risks and ecological risks at the Site. A summary of these risks is shown in Table H - 1. The Site risks resulting from the BRA calculations may be compared to USEPA's risk management guidance range of 1E-04 to 1E-06 for incremental human carcinogenic risk, or a Hazard Index greater than 1.0 for non-carcinogenic risk, as the point of reference for remediation. Based on this comparison, under current industrial use patterns, there is excess risk forworkers and visitors at the Site which clearly requires remediation.

The Hazard Index (HI) for non-carcinogenic risks is less than 1.0 for all areas and scenarios considered during the RI's Baseline Risk Assessment. The areas of concern where the 1E-06 incremental human carcinogenic risk threshold is expected to be exceeded are:

- Adult Maintenance Workers in the Main Processing Area, exposed to PCB's and PAH compounds in dusts and subsurface soils. These contaminants occur in the Green Carbon PCB Spill Area (PCBs) and Drum Storage Area (PCBs and PAHs) in the Main Plant Area of the NSA facility.
- Adolescent Site Visitors to the External Plant Area, exposed to PCB and PAH compounds in soil and dust. PAH compounds were reported in soil samples from an area where solid wastes were staged prior to off-site disposal, immediately adjacent to the PCB Soil Stockpile Area.
- Adolescent Site Visitors and Adult Site Visitors to the Refractory Brick Disposal Areas, exposed to PCBs and PAH compounds in soil and dust.

During the RI's Ecological Risk Assessment and after Region IV's further ecorisk evaluation, the following concern was noted based on high Hazard Indices calculated from conservative benchmarks:

- Fauna inhabiting the Refractory Brick Disposal Areas, exposed to PCBs, PAH compounds, and inorganic constituents in surface soils.

Further issues identified in the Interim ROD for the Interim Remedial Action and which continue to require attention are:

- The potential for groundwater contamination from leachate in the Taylors Wash Landfill.
- Groundwater above MCLs for cyanide and fluoride in the North Plume Area.

Contaminants of concern in several instances are PCBS, resulting from transport of soil from past excavations in the Main Plant Area and the Green Carbon PCB Spill Area. The causative elements for inclusion of each of the areas of concern are summarized on Table H - 2. The areas are described in Section 2.3 of the NSA FS.

Table H - 1: Summary of Calculated Risks

Area & Receptors	Hazard Index (RME)	Carcinogenic Risk (RME)	Hazard Index (CT)	Carcinogenic Risk (CT)	Main Pathways & Constituents	Locations
Main Processing Area						
Adult Indoor Worker	2 E - 06	1 E - 06	2 E - 06	2 E - 08	Ingestion of Soil: Benzo(a)pyrene, Dibenzo(h) anthracene	Drum Storage Area
Adult Maintenance Worker	3 E - 05	7 E - 06	1 E - 06	4 E - 07	Inhalation of Soil : PCBs, Benzo(a)pyrene	Green Carbon PCB Spill Area, and Drum Storage Area
Adult Maintenance Worker	2 E - 06	1 E - 06	9E - 07	5 E - 08	Inhalation of Soil/ Ingestion of Soil: Benzo(a)pyrene, PCB (Aroclor 1242)	Landfill & PCB Soil Stockpile Area
Adolescent Site Visitors	2 E - 01	2 E - 06	1 E - 01	2 E - 07	Ingestion of Soil: Benzo(a)pyrene, other PAHs	Landfill Area & PCB Soil Stockpile Area
Adult Site Visitor	7 E - 02	1 E - 06	4 E - 02	2 E - 07	Dermal - soil : Arsenic, Benzo(a)pyrene, other PAHs	Landfill Area & PCB Soil Stockpile Area
Refractory Brick Disposal Areas						
Adolescent Site Visitor	3 E - 02	2 E - 05	1 E - 02	4 E - 07	Ingestion of Soil : Benzo(a)anthracene Benzo(a)pyrene, other PAHs	Refractory Brick Disposal Areas
Adult Site Visitor	8 E - 03	2 E - 05	4 E - 03	6 E - 07	Dermal - Soil : Benzo(a)pyrene, other PAHs	Refractory Brick Disposal Areas

Notes :

RME = Reasonable Maximum Exposure contaminant levels

CT = Central Tendency contaminant levels

Table H - 2 : Causative Elements for Remediation				
Focus Area	**Current Incremental RME Carcinogenic Risk Above 1 X 10 $^{-6}$**	**PCBs**	**PAH Compounds**	**Ground Water Protection Issue**
Green Carbon PCB Sill Area	Yes	Yes	No	Yes
Refractory Brick Disposal Areas	Yes	Yes	Yes	No
PCB Soil Stockpile Area	Yes	Yes	No	No
Adjacent Landfill Area	Yes	Yes	Yes	No
Drum Storage Area	Yes	Yes	Yes	No
Taylors Wash Landfill	No	Yes	Yes	Yes
Old South Slurry Pond	No	No	No	Yes
Ground Waster	No	No	No	Yes

I. DESCRIPTION OF ALTERNATIVES

The objective of this section is to provide a brief explanation of the remedial alternatives developed for the Site. A description of each alternative is presented below.

I. 1 Alternative 1 - No Action.

- Green Carbon PCB Spill Area.
  - No action.
- Refractory Brick Disposal Area.
  -No action.
- Taylors Wash.
  - No action.
- Drum Storage Area.
  - No action.
- PCB Soil Stockpile Area.
  - No action.
- Site-wide Groundwater.
  - Shut down ground water extraction and treatment system and stop Site-wide ground water monitoring operation.
- South Pond Closure / Post Closure.
  - No further operation and maintenance.

I.2 Alternative 2 - Institutional Controls and Ground Water Monitoring.

- Green Carbon PCB Spill Area.
  - Impose deed restrictions on land and ground water use and continue Site-wide ground water monitoring.
- Refractory Brick Disposal Area(s).
  - Impose deed restrictions on land use and ground water use and install perimeter fencing and warning signs.
- Taylors Wash Landfill.
  - Impose deed restrictions on land use and ground water use.
- Drum Storage Area.
  -No action.

- PCB Soil Stockpile Area.
  - Impose deed restrictions on land use and ground water use.
- Site-wide Groundwater.
  - Impose deed restrictions on land use and ground water use; shut down ground water extraction and treatment system; continue Site-wide ground water monitoring.
- South Pond Closure / Post Closure.
  - Impose deed restrictions on land use and ground water use, and ground water monitoring.

I.3 Alternative 3 - Institutional and Operational Controls, Remediate Taylors Wash Landfill and Ground Water.

- Green Carbon PCB Spill Area.
  - Impose deed restrictions; impose operational controls; continue Site-wide ground water monitoring.
- Refractory Brick Disposal Area(s).
  - Impose deed restrictions on land use and ground water use and install perimeter fencing and warning signs.
- Taylors Wash Landfill.
  - Impose deed restrictions on land use and ground water use; install RCRA Subtitle D cap/cover.
- Drum Storage Area.
  - No action.
- PCB Soil Stockpile Area.
  - Impose deed restrictions on land use and ground water use.
- Site-wide Groundwater.
  - Impose deed restrictions on land use and ground water use; continue long-term remedial action; continue Site-wide ground water monitoring.
- South Pond Closure/Post Closure.
  - Continue operation and maintenance; impose deed restrictions on land use and ground water use; continue Site-wide ground water monitoring.

I.4 Alternative 4 - Containment.

- Green Carbon PCB Spill Area.
  - Impose deed restrictions on land use and ground water use; paving in areas not already paved; impose operational controls to limit contact with contaminated soils; continue Site-wide ground water monitoring.

- Refractory Brick Disposal Area(s).
  - Impose deed restrictions on land use and ground water use; construct anti-erosion cap/cover; construct perimeter fencing and warning signs.
- Taylors Wash Landfill.
  - Impose deed restrictions on land use, and ground water use; collect and dispose of Landfill leachate, construct RCRA Subtitle D cap/cover; install perimeter fencing and warning signs.
- Drum Storage Area.
  - Excavate contaminated soil and dispose under new Taylors Wash Landfill cap.
- PCB Soil Stockpile Area.
  - Impose deed restrictions on land use and ground water use; construct anti-erosion cap/cover.
- Site-Wide Groundwater.
  - Impose deed restrictions on land use and ground water use; continue operations; continue Site-wide ground water monitoring.
- South Pond Closure / Post Closure.
  - Continue operation and maintenance; impose deed restrictions on land use and ground water use; continue Site-wide ground water monitoring.

1.5 Alternative 5 - Hotspot Removal and Containment (Two options).

- Green Carbon PCB Spill Area.
  - Impose deed restrictions on land use and ground water use;
  - Demolish surface, treatment (pavement) and excavate soil hotspots; reroute utility lines; backfill with clean fill; install low permeability multi-media cap.
  - Impose operational controls to limit contact with contaminated soils; continue Site-wide ground water monitoring.
  - Contaminated materials disposal: for Alternative 5A off-site landfill is designated; for Alternative 5B on-site ex-situ thermal desorption is designated.
- Refractory Brick Disposal Area(s).
  - Impose deed restrictions on land use and ground water use; construct anti-erosion cap.
- Taylors Wash Landfill.
  - Impose deed restrictions on land use and ground water use; collect and dispose of leachate either at an off-site permitted facility or in the ground water treatment system on-site; construct a RCRA Subtitle C cap/cover and install perimeter fencing with warning signs.
- Drum Storage Area.
  - Excavate contaminated soil hotspots and dispose under new Taylors Wash Landfill cap where PCB concentrations allow such disposal.

- ! PCB Soil Stockpile Area.
  - Excavate contaminated soil holtspots and dispose in off-site permitted disposal facility or under new Taylors Wash Landfill cap where PCB concentrations allow such disposal.
- ! Site-Wide Groundwater.
  - Impose deed restrictions on land use and ground water use; continue ground water extraction and treatment operations; continue Site-wide ground water monitoring.
- ! South Pond Closure/Post Closure.
  - Continue operations and maintenance; impose deed restrictions on land use and ground water use; continue Site-wide ground water monitoring.

I.6 Alternative 6 - Complete Removal (Three options).

- ! Green Carbon PCB Spill Area.
  - Decommission structures, pavement, and equipment, both surface and subsurface;
  - Excavate soils to 10 mg/kg remediation standard or lower for both surface and subsurface soils;
  - Disposal of contaminated soils in: A) an off-site landfill; B) an on-site landfill; or C) by on-site thermal desorption treatment;
  - Backfill with clean fill and replace structures, utilities, and pavement.
- ! Refractory Brick Disposal Area(s).
  - Impose deed restrictions on land use and ground water use;
  - Excavation to five (5) foot depth to remove bricks and contaminated soil; dispose of bricks, soil, and debris in sanitary landfill off-site.
  - Close Area(s) with clean backfill and grass seeding;
- ! Taylors Wash Landfill.
  - Impose deed restrictions on land use and ground water use; collect and dispose of Landfill leachate off-site or on-site in ground water treatment system; construct RCRA Subtitle C cap/cover; install perimeter fencing and warning, signs.
- ! Drum Storage Area.
  - Excavate soil hotspots and dispose under new Taylors Wash Landfill cap/cover where PCB concentrations allow such disposal; backfille with clean fill and surface treatment.
- ! PCB Soil Stockpile Area.
  - Excavate surface soils and dispose with material from Green Carbon PCB Spill Area where PCB concentrations allow such disposal; cover Area with clean fill and re-seed.
- ! Site-Wide Groundwater.
  - Impose deed restrictions on land use and ground water use; continue and expand operations to landfills area; monitor ground water as a part of the Site-wide ground water monitoring

effort.

! South Pond Closure/Post Closure.

S Continue operations and maintenance; impose deed restrictions on land use and ground water use, continue ground water monitoring as a part of the Site-wide ground water monitoring effort.

I.2 Common Elements and Distinguishing Features of Each Alternative.

Table J - 1 briefly describes each alternative's compliance with ARARs. The chief ARARs governing the remediation at the Site is 40 CFR 761, which sets, forth the regulations for dealing with PCB remediation wastes, i.e., PCB-contaminated soils, and the CWA which is being addressed by the continued operation of the ground water extraction and treatment system. Alternatives # 1 and # 2 do not satisfy the requirements of 40 CFR 761 and the CWA. # 3 and # 4 only partially satisfy the PCB remediation wastes management requirement, but do satisfy the CWA because they call for the continued operation of the ground water treatment system. Alternatives # 5 (A and B) and # 6 (A, B, and C) are expected to fully satisfy the 40 CFR 761 requirements depending upon the specifics of the remedial design for each alternative option, and fully satisfy the CWA because they plan for the continuous operation of the treatment plant and continueground water monitoring.

The long-term effectiveness and permanence for each option is briefly described in Table J - 1. Alternatives # 1 and # 2 do not provide a permanent solution. Alternatives # 3 and # 4 provide long-term solutions for only a portion of the seven (7) focus areas which need to be addressed by this FROD. Alternatives # 5 and # 6 plan for long-term effectiveness by implementing partial or full soil removal or soil treatment scenarios and by on-site consolidation of remaining soils which have low PCB contamination according to the ToSCA Final Rule, 40CFR 761.

Table J -1 sets forth the “Amount Destroyed or Treated” under the “Reduction of Toxicity, Mobility, or Volume Through Treatment” category. Alternatives # 1 and # 2 do nothing in this regard. Alternative # 3 only allows the ground water treatment plant to continue operations; the maximum amount of ground water treated is determined by the KPDES permit to be 760,000 gallons per day. Alternative # 4 utilizes containment of some of the PCB remedation wastes and does not address removal or treatment. Alternative # 5A reduces contaminated soils volume by removal to an off-site facility, and # 5B reduces soil volume by on-site thermal treatment. Alternatives # 6A and # 6B decrease volume available for exposure by either disposal of soils off-site at an EPA-approvcd disposal facility or on-site into a specially built containment cell. # 6C reduces volume through on-site treatment of soils and on-site containment of residuals.

Estimated times for design and construction, and the estimated time to reach reniediation goals are briefly described in Table J - 1 in the "Time Until Action is Complete" section of "Short-term Effectiveness". Alternatives # 1, # 2, # 3, and # 4 would take less time to complete than Alternatives # 5 and # 6. # 5 and # 6 would take about one year for design and one year or more for construction. For those alternatives which plan for the groundwater treatment plant to continue operation, the treatment plant will run until at least the year 2005, a mininium ten year period from startup.

Estimated capital expenditures, annual O & M, and total present worth costs for the estimated thirty (30) year period of continued Superfund involvement are described in an abbreviated manner in Table J - 1 under "Costs". Alternatives # 6 A,B, an C do not appear to satisfy the desired cost-benefit ratio. Reduction of Site human health risks to acceptable levels would appear to be achieved by the less costly reinediation approaches in Alternatives # 5A and # 5B.

Strictly speaking, presumptive remedies and/or innovative technologies were not included in any of the alternatives examined. All reinediation technologies were standard, accepted approaches to soil and ground water cleanups.

I.3 Expected Outcomes of Each Alternative.

The objective of the Superfund remedial response as described in this Final Record of Decision is the reduction of human health risks an d ecological risks in those areas where significani riskg exist at this Site. The expected outcome of the preferred alternative must be demonstrated to address these specific significant risks.

- Alternative # 1, the no action alternative, by definition worsens the Site's condition since the ground water treatment plant operation is stopped, no ground water monitoring is done, and the PCB- contaminated soils remain in place and available for exposure to receptors for the foreseeable future.
- Alternative # 2 offers about the same outcome as Alternative # 1, except that ground water monitoring is continued; however, unacceptable human health risks remain.
- Alternative # 3 would not significantly reduce human health risks even though it calls for deed restrictions in most areas, the continued operation of the ground water treatment plant, ground water monitoring, and capping the Taylors Wash Landfill.
- Alternative # 4 addresses the ground water issues and requires capping of some areas, but does not address the heavy PCB contamination in soils, in the Green Carbon PCB Spill Area within the main facility, one of the areas of higher human health risk.
- Alternative # 5A builds on Alternative # 4 and removes the PCB hotspots (as defined by the TSCA Final Rule, 40 CFR 761), from the Green Carbon PCB Spill Area and other areas for off-site disposal at an EPA-approved hazardous waste facility. Alternative # 5B substitutes on-site ex-situ thermal treatment of hotspot material for off-site disposal, but maintains the same exposure potential, therefore the same risk.

- Alternative # 6A builds on Alternative # 5A, but is designed to excavate more soil volume by using a lower total PCBs concentration as the cleanup standard and hauling the hotspot soils to an off-site disposal facility. The expected outcome reduces risks on the same order as Alternatives # 5A and # 5B, but remediation costs escalate due to decommissioning and shutdown of some of the NSA plant's production operations, and the need to purchase potliners from another facility. Alternative # 6B's expected outcome reduces risks on the same order as Alternative # 5 and # 6A, but substitutes a newly built on-site landfill cell for on-site disposal, and has much higher costs due to the same NSA plant shutdown needs. Alternative # 6C reduces risks very much like Alternatives # 5, # 6A and B, but utilizes on-site thermal desorption to treat PCB-contaminated soils using the same low cleanup level as Alternatives # 6A and B. Alternatives # 6A, B, and C have the highest estimated capital costs of all alternatives considered; the estimated capital cost for any one of the three (3) Alternative # 6 options is ten (10) times, or one order of magnitude, higher than Alternative # 5A or B, without any significant additional increase in risk reduction.

J. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In the Feasibility Study, numerous alternatives for remediation were developed and then screened based upon five (5) major generic categories of action: 1) no-action; 2) institutional action; 3) containment; 4) treatment; and 5) disposal. An individual analysis of specific alternatives was then made against two (2) threshold evaluation criteria: 1) overall protection of human health and the environment and 2) compliance with ARARs. Surviving alternatives were subjected to a comparative analysis of the alternatives based upon five (5) primary balancing criteria: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility, and volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. This process resulted in six (6) major alternatives for remedial action being retained for further consideration: (1) no-action; (2) institutional controls and operational controls; (3) institutional controls and operational controls; (4) containment of hotspots; (5) containment and hotspot removal with off-site disposal or ex-situ thermal treatment; and (6) complete removal and disposal of hotspots off-site, on-site, or by thermal treatment. Finally, two (2) modifying criteria, 1) state/support agency acceptance; and 2) community acceptance, to determine the acceptable alternative(s). The comparative analysis of alternatives is contained in Table J - 1, which references the six (6) major alternatives and the nine (9) criteria.

J. 1 Threshold Criteria

J. 1. 1 Overall Protection of Human Health and the Environment.

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

J. 1.2 Compliance with ARARs.

Section 121 (d) of CERCLA and NCP § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable Federal and State requirements, standards, criteria, and limitations which are collectively referred to as “ARARs”, unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and, are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for an invoking waiver.

J.2 Primary Balancing Criteria

J.2.1 Long-term Effectiveness and Permanence.

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Each alternative, except the No-Action alternative, provides some degree of long-term protectiveness. The alternatives increase in effectiveness of reducing potential exposure through increasing containment or treatment as additional or enhanced options are added.

Reviews at least every five (5) years, as required, would be necessary to evaluate the effectiveness of any of these alternatives because hazardous substances would remain on-site in concentrations above health-based levels.

J.2.2 Reduction of Toxicity, Mobility, or
Volume through Treatment.

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

J.2.3 Short-term Effectiveness.

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup goals are achieved.

J.2.4 Implementability.

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

J.2.5 Cost.

The estimated present worth costs for the alternatives (including thirty [30] years of O & M), not including the No Action alternative, range from approximately $340,000 for Alternative # 2 to approximately $227,000,000 for Alternative # 6A. Generally, the cost of each alternative increases as the degree of risk reduction increases. However, at a point there is no longer any significant risk reduction for additional funds expended. The estimated capital costs increase by an order of magnitude from Alternative # 5 to # 6. Cost summaries can be found in Table J - 1.

J.3 Modifying Criteria.

J.3.1 State/Support Agency Acceptance.

The State has expressed its support for Alternatives # 5 and # 6. The State does not believe that Alternative # 1 provides adequate protection of human health and the environment. The State does not support Alternative # 2, because it does not use treatment as a permanent solution. The State does not support Alternative # 4 because it does not satisfactorily address subsurface PCB. contamination in the Green Carbon / Pitch Tank area.

J.3.2 Community Acceptance.

During the public comment period, the community expressed its support for either Alternative # 5 or # 6. Alternatives # 1, # 2, # 3, and # 4 were not considered adequately protective; on-site incineration and thermal desorption were opposed by the community.

TABLE J - 1 : COMPARATIVE ANALYSIS OF ALTERNATIVES					
Criteria	**Alternative 01**	**Alternative 02**	**Alternative 03**	**Alternative 04**	**Alternative 05**
OVERALL PROTECTIVENESS	**01**	**02**	**03**	**04**	**05A**
Human Health Protection	CNo Action - Statutory Baseline Case.	CInstitutional Controls and GW Monitoring.	CInstitutional Controls and Operational Controls.	CContainment.	CHotspot Removal & Containment & Disposal in Off-site Landfill.
C Direct Contact/Soil Ingestion	CRisk would remain since no caps would be built and there would be no containment.	CRisk would remain since no caps, but some fencing and deed restrictions with monitoring.	COperational controls to limit exposure in GCPCBS Area and cap on TWLandfill.	CProvides cap for each of the main areas of concern: GCPCBSA, RBDAs, TWL, PCBSA, & DSA.	CProvides for cap for each of the main areas: GCPCBSA, RBDAs, TWL, PCBSA, & DSA. Provides for soil removal from GCPCBSA, PCBSA, & DSA.
C Ground Water Ingestion for Current Users C Ground Water Ingestion for Potential Users	CGW is an incomplete pathway at the Site since it is not used for drinking or contact. GWTS would be shut down.	CGWTS would be shut down. GW Monitoring would continue to occur. Risks would remain the same or increase.	CGWTS continues operation. Restrictions on GW use continue into the future. Risks to future potential GW users decrease.	CGWTS continues operation. Restrictions on GW use continue. Risks to future potential GW users decrease.	CGWTS continues to operate. Restrictions on GW use continue. Leachate from TWL is treated in GWTS.
C Surface Water	CWould not mitigate threat to SW from erosion.	CWould not mitigate threat to SW since no physical actions occur.	CWould partially mitigate threat to SW through capping and operational controls.	CWould partially mitigate threat to SW through containment and operational controls.	CWould mostly mitigate threat to SW through containment, removal, and operational controls of sources.

Environmental Protection	CWould maintain or increase risk of spread of contamination over time to the surrounding environment.	CWould maintain or increase risk of contamination migration over time despite limited restrictions & monitoring.	CWould tend to decrease risk of contamination migration due to partial containment of landfills and subsurface problems.	CWould tend to decrease risk of contamination migration due to partial containment of landfills and subsurface problems.	CWould decrease risk of contamination migration due to containment of landfills and subsurface problems and partial removal of contaminated soils.
COMPLIANCE WITH ARARs	**01**	**02**	**03**	**04**	**05A**
Major Chemical-Specific ARARs	C 40 CFR 761: PCBs Not addressed by # 01	C 40 CFR 761: PCBs Not addressed by # 02	C 40 CFR 761: PCBs Partially addressed by	C 40 CFR 761: PCBs Partially addressed by	C 40 CFR 761: PCBs
Major Location-Specific ARARs	C 33 CFR 320-330: CWA Not addressed by # 01	C 33 CFR 320-330: CWA Not addressed by # 02	C 33 CFR 320-330: CWA	C 33 CFR 320-330: CWA	C 33 CFR 320-330: CWA
Major Action-Specific ARARs	C 40 CFR 261-265, 268: RCRA Not addressed by # 01	C 40 CFR 261-265, 268: RCRA Not addressed by #02	C 40 CFR 261-265, 268: RCRA	C 40 CFR 261-265, 268: RCRA	C 40 CFR 261-265, 268: RCRA
Other Criteria and Guidance	C 40 CFR 131: CWA 40 CFR 141: SDWA Not addressed by # 01	C 40 CFR 131: CWA 40 CFR 141: SWDA Not addressed by # 02	C 40 CFR 131: CWA 40 CFR 141: SDWA	C 40 CFR 131: CWA 40 CFR 141: SDWA	C 40 CFR 131: CWA 40 CFR 141: SWDA
LONG-TERM EFFECTIVENESS AND PERMANENCE	**01**	**02**	**03**	**04**	**05A**

Magnitude of Residual Risk	No Action alternative.	Institutional controls and GW monitoring.	Institutional controls and operational controls.	Institutional and operational controls and containment.	Containment & Hotspot Removal & Off-site Disposal.
C Direct Contact/Soil Ingestion	COvertime would increase the risk of direct contact and ingestion to >1E-06 and >1E-05 for CR since no containment would occur.	CEven with imposition of deed restrictions and fencing, over time would increase the risk of direct contact & ingestion since no containment.	CRisk would tend to be lessened by addition of operational controls to restrict actual physical contact & exposure.	CRisk would be lessened by containment of contaminated surface and subsurface soils: subsurface PCB contamination would be left in place.	CRisk would be significantly lessened by containment of contaminated surface and subsurface soils & removal of shallow subsurface soils w / PCB contamination.
C Ground Water Ingestion for Current Users	CAn incomplete pathway. No Action would harm current GW situation even under an industrial use scenario. GWTS would cease operations. GW monitoring would cease. Some COCs would remain over MCLs.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue. Risk for current GW scenarios would remain about the same, but would be less than for No Action.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue. Risk for current GW scenarios would remain about the same, but would be less than for No Action.	CAn incomplete pathway GWTS would continue operations. GW monitoring would continue. Risk for current GW scenarios would remain about the same, but would be less than for No Action.	CAn incomplete pathway. GWTS would continue to operate. GW monitoring would continue. Risk for current GW scenarios would remain about the same, but would be less than for No Action.

Criteria	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05A
C Ground Water Ingestion for Potential Future	CAn incomplete pathway. No Action would maintain current situation unless GW use restrictions were lifted under other use scenarios. Some COCs would remain over MCLs.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue. Risk for potential future users would remain same as calculated in BRA.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue into the future. Risk for future users would remain same as calculated in BRA.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue into the future. Risk for future users would remain same as calculated in the BRA.	CAn incomplete pathway. GWTS would continue operations. GW monitoring would continue into the future. Risk for future users would tend to decrease slightly due to hotspot removal.
Adequacy and Reliability of Controls	CNo Action maintains current situation with no controls except for deed restrictions or GW restrictions already imposed.	CNo operational controls of consequence. GWTS would continue to operate. Deed restrictions imposed on contaminated areas. GW monitoring continued. Deed restrictions may not be followed.	CDeed restrictions, fencing, signs, and operational controls to restrict activities & physical exposure in contaminated areas, i.e., GCPCBSA. Deed restrictions may not be followed. Cap on TWL reliable. Controls only partial reliable.	CCaps over areas of contamination & some fencing around them provide mostly adequate access and exposure control. GWTS operation manages GW contamination. Deed restrictions & signage increase access control over containment.	CRemoval of hotspots in GCPCBSA, PCBSA, DSA, TWL & capping or covering of these areas & RBDAs would provide adequate control of exposures. Operational controls in the GCPCBSA would decrease chance of future exposures to PCBs. TWL leachate to be treated in GTWS.

Need for 5-Year Review	CSince Hss, pollutants, & contaminants would remain on-site at above regulatory concentrations, five-year reviews would be mandatory.	CSince Hss, pollutants, & contaminants remain on-site at above regulatory concentrations, five-year reviews would be mandatory.	CSince Hss, pollutants, & contaminants remain on-site at above regulatory concentrations, five-year reviews would be mandatory.	CSince Hss, pollutants, & contaminants would remain on-site at above regulatory concentrations, five-year reviews would be mandatory.	CSince Hss, pollutants, & contaminants would remain on-site at above regulatory concentrations, five-year reviews would be mandatory.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	**01**	**02**	**03**	**04**	**05A**
Treatment Process Used	CNo Action - natural attenuation. Does not satisfy the statutory oreference for treatment.	CNo treatment for soils. GW treated in GWTS.	CNo treatment for soils. GW treated in GWTS.	CNo treatment of soils. Containment & exposure mitigation by capping, covering, & operational controls.	CNo treatment of soils. GW treated in GWTS. Leachate from TWL treated in GWTS. Off-site disposal of hotspots.
Amount Destroyed or Treated	CNo Action - no treatment. Natural attenuation; no destruction of COCs.	CNo treatment of soils. GW treated in GWTS; amounts recorded in monthly KPDES permit. No treatment of landfill leachate.	CNo treatment of soils. GW treatment continued w/ amounts recorded for KPDES permit. No treatment of landfill leachate.	CContainment of areas of soil contamination, but not treatment. GW treatment continued w/ amounts recorded for KPDES permit. No treatment of landfill leachate.	CRemoval of hotspots in GCPCBSA, DSA, PCBSSA, et al for off-site disposal. No destruction or treatment of soil contamination. GW treatment continued w/ amounts recorded for KPDES permit. TWL leachate to be treated in GWTS w/ GW.

Reduction of Toxicity, Mobility, or Volume	CNo Action - none, except natural attenuation. COCs would maintain potential for mobility.	CContinued operation of GWTS will gradually reduce toxicity, mobility, and volume of contaminated GW. No reduction of TMV for contaminated soils.	CContinued operation of GWTS will gradually reduce TMV of contaminated GW. No reduction of TMV for contaminated soils.	CContainment of contaminated soils reduces chances of M only. GW treatment gradually reduces TMV for GW contamination.	CTMV of contaminated GW and of TWL leachate gradually reduced by GWTS treatment. Contaminated soils V reduced by off-site disposal.
Irreversible Treatment	CNo Action - no treatment**.**	CGW treatment may be considered irreversible. No soil treatment.	CGW treatment may be considered irreversible. No soil treatment.	CGW treatment may be considered irreversible. No soil treatment.	CGW and TWL leachate treatment may be considered irreversible. No soil treatment.
Type and Quantity of Residuals Remaining After Treatment	CNo Action - no treatment. Type and quantity of COCs in source would remain the same.	CGW treatment produces residuals in spent carbon and filter press sludges; hundreds of pounds per year are disposed off-site. Soils not treated.	CGW treatment produces residuals in spent carbon and filter press sludges; hundreds of pounds per year are disposed off-site. Soils not treated.	CGW treatment produces residuals in spent carbon and filter press sludges; hundreds of pound per year are disposed off-site. Soils not treated.	CGW and TWL leachate treatment in GWTS produces spent carbon and filter press sludges; hundreds of pounds per year disposed off-site. Soils not treated.
Statutory Preference for Treatment	CNo Action - does not satisfy preference.	CSatisfies preference for GW only.	CSatisfies preference for GW only.	CSatisfies preference for GW only. Does not satisfy preference for soils.	CSatisfies preference for GW and TWL leachate only. Does not satisfy preference for soils.
SHORT-TERM EFFECTIVENESS	**01**	**02**	**03**	**04**	**05A**

Time Until Action is Complete	CNo Action indicates all GW treatment would cease and O&M in other CERCLA areas would stop.	CGW treatment would continue for years until Interim ROD cleanup standards for aquifer are consistently met. Deed restrictions done within one year.	CGW treatment would continue for years until Interim ROD cleanup standards for aquifer are consistently met. Deed restrictions done within one year.	CGW treatment would continue for years until Interim ROD cleanup standards for aquifer are consistently met. Deed restrictions done within one year. Containment of major soil contamination sources will take at least one year.	CGW treatment would continue for years until Interim ROD cleanup standards for aquifer are consistently met. Deed restrictions done within one year. Removal of hotspots& containment of major soil contamination areas & construction of TWL leachate force main will take over a year.
IMPLEMENTABILITY	**01**	**02**	**03**	**04**	**05A**
Ability to Construct and Operate	CNo Action - nothing to construct or operate.	CGWTS is currently being operated. Institutional controls easily implemented.	CGWTS is currently being operated. Institutional controls easily implemented. Operational controls in GCPCBSA easily implemented.	CGWTS is currently being operated. Institutional controls easily implemented. Containment w/ cap & covers of main contaminated soil areas easily constructed except for GCPCBSA in main plant area.	CGWTS currently being operated. Institutional controls easily implemented. Cap & covers on main AOCs easily constructed except for GCPCBSA in main plant area. Leachate line from TWL to GWTS constructed w/ acceptable difficulty.
Ease of Doing More Action If Needed	CMore can be easily done at any time.	CMore can be easily done at any time.	CMore can be easily done at any time.	CMore can be easily done at any time except for some difficulties in GCPCBSA.	CMore can be done at any time except for some difficulties in GCPCBSA.

Criteria	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05A
Ability to Monitor Effectiveness	CAbility to monitor effectiveness of alternative is hampered since all monitoring stops.	CGW monitoring system is in place and operating. Effectiveness of Institutional controls can be only loosely monitored.	CGW monitoring system is in place and operating. Effectiveness of institutional controls can be only loosely monitored.	CGW monitoring system in place and operating. Effectiveness of institutional controls can be only loosely monitored.	CGW monitoring system in place and operating. Effectiveness of institutional controls can be only loosely monitored. New MWs east of GCPCBSA provide additional checks on effectiveness.
Ability to Obtain Approvals and Coordinate with Other Agencies	CUnable to obtain approval for 'No Action' from State.	CUnable to obtain State approval for maintenance of current situation due to extant PCB contamination.	CUnable to obtain State approval for alternatives which do not directly address PCB contamination.	CUnable to obtain approval for alternatives which do not directly address PCB contamination.	CTentative approval for modified Alternative 5A given by State early in 1999 since it directly addresses PCB contamination.
Availability of Equipment, Specialists, and Materials	CNo Action - no equipment. no specialists, no materials needed.	CEquipment, specialists, & materials already being utilized under current situation.	CEquipment, specialists, & materials commercially available.	CEquipment, specialists, & materials commercially available.	CEquipment, specialists, & materials commercially available.

Availability of Technologies	CNo Action - no technologies needed.	CNo additional technologies necessary for GW.	CNo additional technologies necessary for GW.	CTechnologies for capping & covering are well-known.	CTechnologies for removal, disposal off-site & capping & covering are well-known. Technologies for TWL leachate conveyance & treatment are well-known.
COST	**01**	**02**	**03**	**04**	**05A**
Capital Cost (Less Cost of GWTS & OSSP)	$0	$120,750	$1,870,750	$4,522,000	$10,157,000
First Year Annual O&M Cost	$0	$17,500	$971,250	$1,201,746	$1,203,125
Present Worth Cost (30 years O & M)	$0	$338,077	$13,921,053	$19,432,063	$25,115,736
STATE ACCEPTANCE	CState will not accept No Action..	CState will not accept since containment/ destruction and subsurface PCBs inGCPCBSA were not addressed.	CState would not accept since containment/ destruction and subsurface PCBs inGCPCBSA were not addressed.	CState would not accept since subsurface PCBs in GCPCBSA were not addressed.	CState would accept because PCBs in GCPCBSA were addressed by partial removal and long-term monitoring.
COMMUNITY ACCEPTANCE	**01**	**02**	**03**	**04**	**05A**

	¢Community would not accept.	¢Community would not accept.	¢Community would not accept.	¢Community would not accept because PCB contamination would not be removed from Site.	¢Community did not say it would accept Alt. 5A, but opined that chemical treatment on-site was more acceptable than off-site disposal.

TABLE J - 1 (cont'd): COMPARATIVE ANALYSIS OF ALTERNATIVES					
Criteria	**Alternative 05B**	**Alternative 06A**	**Alternative 06B**	**Alternative 06C**	
OVERALL PROTECTIVENESS	**05B**	**06A**	**06B**	**06C**	
Human Health Protection	•Hotspot Removal & Ex-situ Thermal Desorption & Containment	•Complete Removal of Hotspots & Disposal Off-site & Containment	•Complete Removal of Hotspots & Disposal in On-site Landfill & Containment.	•Complete Removal of Hotspots & On-site Thermal Desorption & Containment	
• Direction Contact/Soil Ingestion	•Reduces risk for direct contact w/ cont'd soils & ingestion through containment after contamination reduction in GCPCBSA	•Reduces risk of direct contact & ingestion by complete removal to off-site secure landfill of surface & subsurface hotspots followed by containment.	•Reduces risk of direct contact & ingestion by complete removal to on-site secure landfill & containment of other AsOC.	•Reduces risk of direct contact & ingestion by complete removal & on-site thermal desorption & redisposal on-site; and containment of other AsOC.	
• Ground Water Ingestion for Current Users	•Gradual reduction of risk by continued GW treatment. No pathway really exists currently.	•Gradual reduction of risk by continued GW treatment. No pathway really exists currently.	•Gradual reduction of risk by continued GW treatment. No pathway really exists currently.	•Gradual reduction of risk by continued GW treatment. No pathway really exists currently.	
• Ground Water Ingestion for Potential Users	•Gradual reduction of risk by continued GW treatment.	•Gradual reduction of risk by continued GW treatment.	•Gradual reduction of risk by continued GW treatment.	•Gradual reduction of risk by continued GW treatment.	

Environmental Protection	•Contaminated soils left at depth in GCPCBSA, in TWL, & RBDAs. GCPCBSA cont'd soils volume reduced.	•Contaminated soils left in TWL. Cont'd soils removed from GCPCBSA, RBDAs, DSA, PCBSSA to off-site secure landfill.	•Contaminated soils left in TWL. Cont'd soils removed from GCPCBSA, RBDAs, DSA, PCBSSA to on-site secure landfill.	•Contaminated soils left in TWL. Cont'd soils removed from GCPCBSA, RBDAs, DSA, PCBSSA & treated by thermal desorption.	
COMPLIANCE WITH ARARs	**05B**	**06A**	**06B**	**06C**	
Major Chemical-Specific ARARs	•40 CFR 761:PCBs	•40 CFR 761:PCBs	•40 CFR 761:PCBs	•40 CFR 761: PCBs	
Major Location-Specific ARARs	•33 CFR 320-330: CWA	•33 CFR 320-330: CWA	•33 CFR 320-330: CWA	•33 CFR 320-330: CWA	
Major Action-Specific ARARs	•40 CFR 261-265, 268: RCRA	•40 CFR 261-265, 268: RCRA	•40 CFR 261-265, 268: RCRA	•40 CFR 261-265, 268: RCRA	
Other Criteria and Guidance	•40 CFR 131: CWA 40 CFR 141: SDWA	•40 CFR 131: CWA 40 CFR 141: SDWA	•40 CFR 131: CWA 40 CFR 141: SDWA	•40 CFR 131: CWA 40 CFR 141: SDWA	
LONG-TERM EFFECTIVENESS AND PERMANENCE	**05B**	**06A**	**06B**	**06C**	
Magnitude of Residual Risk	•Hotspot Removal & Ex- situ Thermal Desorption & Containment	•Complete Removal of Hotspots & Disposal Off-site & Containment	•Complete Removal of Hotspots & Disposal in On-site Landfill & Containment	•Complete Removal of Hotspots & On-site Thermal Desorption & Containment	

Criteria	Alternative 05B	Alternative 06A	Alternative 06B	Alternative 06C	
• Direction Contact/Soil Ingestion	•Would decrease long-term on-site risks due to destruction of hotspots & containment of major AsOC.	•Would decrease long-term on-site risks due to removal of soils to off-site secure landfill & due to containment of major AsOC.	•Would decrease long-term on-site risks due to removal of soils to on-site secure landfill & due to containment of major AsOC.	•Would decrease long-term on-site risks due to om-site thermal desorption of soils & due to containment of major AsOC.	
• Groundwater Ingestion for Current Users	•No complete current pathway. Longer-term, would gradually decrease risks due to continued P & T of GW.	•No complete current pathway. Longer-term, would gradually decrease risks due to continued P & T of GW.	•No complete current pathway. Longer-term, would gradually decrease risks due to continued P & T of GW.	•No complete current pathway. Longer-term, would gradually decrease risks due to continued P & T of GW.	
• Ground Water Ingestion for Potential Future Users	•Would gradually decrease risks due to continued P & T of GW.	•Would gradually decrease risks due to continued P & T of GW & removal of cont'd soils to off-site secure landfill.	•Would gradually decrease risks due to continued P & T of GW & removal of cont'd soils to on-site secure landfill.	•Would gradually decrease risks due to continued P & T of GW & thermal desorption of cont'd soils.	

Adequacy and Reliability of Controls	•Only partial control over subsurface soils contamination in GCPCBSA, i.e., new MWs. Only partial control over TWL leachate because of floodplain water table at River highwater events. Site-wide GW P & T & monitoring continues.	•More adequate control over surface & subsurface soil contamination due to cont'd soil removal to off-site landfill. Only partial control over TWL leachate due to rise of floodplain water table after River highwater events. Site-wide GW P & T & monitoring continues.	•More adequate control over surface & subsurface soil contamination due to cont'd soil removal to off-site landfill. Only partial control over TWL leachate due to rise of floodplain water table after River highwater events. Site-wide GW P & T & monitoring continues.	•More adequate control over surface & subsurface soil contamination due to cont'd soil thermal desorption on-site. Only partial control over TWL leachate due to rise of floodplain water table after River highwater events. Site-wide GW P & T & monitoring continues.	
Need for 5-Year Review	•Hss, pollutants, & contaminants remain on-site; five-year reviews mandatory.	•Hss, pollutants, & contaminants remain on-site; five-year reviews mandatory.	•Hss, pollutants, & contaminants remain on-site; five-year reviews mandatory.	•Hss, pollutants, & contaminants remain on-site; five-year reviews mandatory.	
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	**05B**	**06A**	**06B**	**06C**	
Treatment Process Used	•Thermal desorption for soils from GCPCBSA. Standard GW treatment in existing GWTS for TWL leachate.	•None for soils; off-site secure landfill. GW & TWL leachate treated in existing GWTS.	•None for soils; on-site secure landfill. GW & TWL leachate treated in existing GWTS.	•Thermal desorption for soils from GCPCBSA & PCBSSA. TWL leachate treated in existing GWTS.	

Amount Destroyed or Treated	•Soil volume, GW gallonage, & TWL leachate gallonage treated unknown at this time. GWTS treats max 750,000 gallons each day.	•Soil removed, not treated. GW gallonage, & TWL leachate gallonage treated unknown at this time. GWTS treats max 750,000 gallons each day.	•Soil removed, not treated. GW gallonage, & TWL leachate gallonage treated unknown at this time. GWTS treats max 750,000 gallons each day.	•Soil volume, GW gallonage, & TWL leachate gallonage treated unknown at this time. GWTS treats max 750,000 gallons each day.	
Reduction of Toxicity, Mobility, of Volume	•Reduction of volume of soils removed from GCPCBSA. Reduction of toxicity for those soils removed & treated. Mobility reduces through containment of major AsOC.	•Reduction of on-site soil volume in GCPCBSA & PCBSSA through removal to off-site landfill. Reduction of potential on-site GW contamination through GW treatment. Negligible reduction of soil contaminant toxicity. Less contaminated soils & GW on-site means less contamination to migrate.	•No reduction of on-site soil contaminants volume in GCPCBSA & PCBSSA because of removal to on-site landfill. Reduction of potential on-site GW contamination through GW & TWL leachate treatment. Negligible reduction of soil contaminants toxicity. Contained contaminated soils & less potential contaminated GW on-site means less contamination available to migrate.	•Reduction of on-site soil contaminants volume in GCPCBSA & PCBSSA because of thermal desorption. Reduction of potential on-site GW contamination through GW & TWL leachate treatment. Some reduction of soil contaminants toxicity. Contained contaminated soils & less potential contaminated GW on-site means less contamination available to migrate.	
Criteria	**Alternative 05B**	**Alternative 06A**	**Alternative 06B**	**Alternative 06C**	

Irreversible Treatment	•Thermal desorption of PCB-contaminated soils is irreversible. Treatment of GW & TWL leachate in existing GWTS is also.	•No treatment of soils. Treatment of GW & TWL leachate in existing GWTS is irreversible.	•No treatment of soils. Treatment of GW & TWL leachate in existing GWTS is irreversible.	•Thermal desorption of PCB-contaminated soils is irreversible. Treatment of GW & TWL leachate ins existing GWTS is also.	
Type and Quantity of Residual Remaining After Treatment	•Residuals from thermal desorption include cleaned soils to be backfilled, Q unknown, and spent carbon & PCB-cont'd fines in sludge. GWTS produces spent carbon and filter press sludge, Q unknown.	•Residual from GWTS treating GW & TWL leachate are spent carbon and filter press sludge. Q unknown at this time.	•Residual from GWTS treating GW & TWL leachate are spent carbon and filter press sludge. Q unknown at this time.	•Residuals from thermal desorption include cleaned soils to be backfilled, Q unknown, and spent carbon & PCB- cont'd fines in sludge. GWTS produces spent carbon and filter press sludge, Q unknown.	
Statutory Preference for Treatment	•Satisfied statutory preference for treatment of some soils, GW, and TWL leachate.	•Satisfies statutory preference for treatment of GW & TWL leachate.	•Satisfies statutory preference for treatment of some soils, GW & TWL leachate.	•Satisfies statutory preference for treatment of most soils, GW, and TWL leachate.	
SHORT-TERM EFFECTIVE NESS	**05B**	**06A**	**06B**	**06C**	

Community Protection	•In short-term, risk to nearby communities is about the same as current situation.	•In short-term, risk to nearby communities is slightly higher than current situation due to transport of cont'd soils over public highways	•In short-term, risk to nearby communities is about the same as current situation since excavated cont'd soils are not moved off-site, but contained on-site.	•In short-term, risk to nearby communities, especially to east of Site, is slightly higher than current situation due to on-site thermal treatment of cont'd soils.	
Worker Protection	•In short-term, risk to plant & remediation workers is elevated due to excavations of cont'd soils & thermal desorption activities on-site.	•In short-term, risk to plant & remediation workers is elevated due to excavations of cont'd soils and soil conveyance activities on-site & off-site.	•In short-term, risk to plant & remediation workers is elevated due to excavations of cont'd soils & soil conveyance activities on-site.	•In short-term, risk to plant & remediation workers is elevated due to excavations of cont'd soils & soil conveyance activities on-site; and thermal desorption activities-site.	
Environmental Impacts	•Continued, but decreasing impacts from cont'd GW. As imposition of containment proceeds, decreases in migration through erosion will occur.	•Continued, but decreasing impacts from cont'd GW. As imposition of containment proceeds, decreases in migration through erosion will occur.	•Continued, but decreasing impacts from cont'd GW. As imposition of containment proceeds, decreases in migration through erosion will occur.	•Continued, but decreasing impacts from cont'd GW. As imposition of containment proceeds, decreases in migration through erosion will occur.	

Time Until Action is Complete	•GW treatment will not be finished for at least 10 years. TWL leachate treatment will continue for at least 15 years. Soil removal & treatment will take at least one year.	•GW treatment will not be finished for at least 10 years. TWL leachate treatment will continue for at least 15 years. Soil removal will take at least one year.	•GW treatment will not be finished for at least 10 years. TWL leachate treatment will continue for at least 15 years. Soil removal will take at least one year.	•GW treatment will not be finished for at least 10 years. TWL leachate treatment will continue for at least 15 years. Soil removal & treatment will take at least one year.	
IMPLEMENTABILITY	**05B**	**06A**	**06B**	**06C**	
Ability to Construct and Operate	•Construction of containment caps & covers not difficult <u>except</u> for GCPCBSA where plant buildings & utilities are very close. GCPCBSA operations difficult due to regular plant activities in the area. Leachate line from TWL to GWTS may require a booster station.	•Roads will handle off-site disposal truck traffic. Construction of containment caps & covers not difficult <u>except</u> for GCPCBSA where plant buildings & utilities are very close. GCPCBSA operations difficult due to regular plant activities in the area. Leachate line from TWL to GWTS may require a booster station.	•Plenty of area for on-site secure landfill, if permitted in floodplain. Construction of containment caps & covers not difficult <u>except</u> for GCPCBSA where plant buildings & operastions are very close. GCPCBSA operations difficult due to regular plant activities in the area. Leachate line from TWL to GWTS may require a booster station.	•Plenty of area for on-site thermal desorption unit, if permitted by State & community. Construction of containment caps & covers not difficult <u>except</u> for GCPCBSA where plant buildings & utilities are very close. GCPCBSA operations difficult due to regular plant activities in the area. Leachate line from TWL to GWTS may require a booster station.	

Ease of Doing More Action If Needed	•More action may be easily taken except for GCPCBSA where construction would be very difficult due to close proximity of plant buildings & utilities.	•More action may be easily taken, but not anticipated due to complete removal of cont'd soils from site.	•More action may be easily taken, but not anticipated due to complete removal of cont'd soils & disposal in one on-site secure landfill	•More action may be easily taken, but not anticipated due to complete removal & thermal treatment of cont'd soils & redisposal on-site.	
Ability to Monitor Effectiveness	•Site-wide GW monitoring would continue. GWTS would operate w/S & A according to KPDES permit. Effect of removal in GCPCBSA monitored with several new MWs.	•Site-wide GW monitoring would continue. GWTS would operate w/S & A according to KPDES permit. Effect of removal in GCPCBSA monitored with several new MWs.	•Site-wide GW monitoring would continue. GWTS would operate w/S & A according to KPDES permit. Effect of removal in GCPCBSA monitored with several new MWs.	•Site-wide GW monitoring would continue. GWTS would operate w/ S & A according to KPDES permit. Effect of removal in GCPCBSA monitored with several new MWs.	
Ability to Obtain Approvals and Coordinate with Other Agencies	•State approvals for on-site thermal desorption may be difficult because of the community's nonacceptance. Coordination with other agencies may be difficult because of air emissions.	•State approvals for off-site disposal may be difficult because of the community's nonacceptance of conveyance of cont'd soils over public highways. Coordination with other agencies may be difficult because of NIMBY issues.	•State approvals for on-site disposal may be difficult because of the community's nonacceptance of secure landfill nearby. Coordination with other agencies may be difficult because of NIMBY issues.	•State approvals for on-site thermal desorption may be difficult because of the community's nonacceptance. Coordination with other agencies may be difficult because of air emissions issues.	

Availability of Equipment, Specialist, and Materials	•Equipment, specialists, & materials are all readily available.	•Equipment, specialists, & materials are all readily available.	•Equipment, specialists, & materials are all readily available.	•Equipment, specialists, & materials are all readily available.	
Available of Technologies	•Basic civil & environmental remediation technologies available. Scheduling of thermal desorption firm may be critical.	•Basic civil & environmental technologies available.	•Basic civil & environmental technologies available.	•Basic civil & environmental remediation technologies available. Scheduling of thermal desorption firm may be time critical.	
COST	**05B**	**06A**	**06B**	**06C**	
Capital Cost (Less Cost of GWTS & OSSP)	$12,873,000	$211,512,000	$188,692,000	$199,263,750	
First Year Annual O&M Cost (+ Misc., Engrg., OSSP)	$1,203,125	$1,192,625	$1,367,625	$1,192,625	
Present Worth Cost (30 years O & M)	$27,864,109	$226,313,900	$205,649,184	$214,060,650	
STATE ACCEPTANCE	•State would accept if community would accept on-site or off-site thermal treatment.	•State would accept if remedy cost could be shown not to tend to cause workers to lose jobs or facility to be shut down.	•State would accept if remedy cost could be shown not to tend to cause workers to lose jobs or facility to be shut down.	•State would accept if remedy cost could be shown not to tend to cause workers to lose jobs or facility to be shut down, and if community would accept on-site thermal treatment.	

COMMUNITY ACCEPTANCE	**05B**	**06A**	**06B**	**06C**	
	•Community would not accept thermal treatment due to on-site & off-site health concerns.	•Community would accept if remedy cost would not cost plant jobs or plant shutdowns. Community does not like transportation of hazwaste over local roads.	•Community would accept if remedy cost would not cost plant jobs or plant shutdown. On-site secure landfill in floodplain may cause community nonacceptance.	•Community would accept if remedy cost would not cost plant jobs or plant shutdown. On-site soil thermal treatment would cause nonacceptance.	

K. PRINCIPAL THREAT WASTES

The NCP establishes an expectation that the USEPA will use treatment to address principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The ‘principal threat’ concept is applied to the characterization of ‘source materials’ at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only low risk in the event of exposure. According to *A Guide to Principal Threat and Low Level Threat Wastes (OSWER 9380.3-06FS, November 1991*), wastes that generally do not constitute principal threats include, but are not limited to, the following: (1) non-mobile contaminated source material of low to moderate toxicity (surface soil containing chemicals of concern (COCs) that generally are relatively immobile in air or ground water, i.e., non-liquid, low volatility, low leachability contaminants such as high molecular weight compounds) and (2) low toxicity source material (soil and subsurface soil concentrations not greatly above reference dose levels or that present an excess cancer risk near the acceptable risk range were exposure to occur).

The chief COCs being addressed by this Final ROD are Aroclors of PCBs which are contaminating surface soils, subsurface soils, and sediments in mostly low occupancy areas in and surrounding an industrial facility. PCBs are rather stable compounds and relatively immobile in air and ground water, and are generally of low volatility and low leachability. PCBs in specific hotspots and at depth are above reference dose levels and would present an unacceptable risk should chronic exposure occur. However, in the current specific environmental setting, PCBs at the surface and at depth in subsurface soils present low, but significant risks, according to the human health and ecological risk assessments. Post-remediation risks, even with some low level bulk PCB-remediation wastes contained at depth on-site, are expected to be acceptable. Therefore, the PCB-contaminated soils appear to be classified as ‘non-mobile contaminated source material of low to moderate toxicity’, according to *OSWER 9380.3-06FS*, and therefore will not constitute principal threats subject to NCP §300.430(a)(1)(iii)(A).

L. THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine (9) criteria, and public comments, both USEPA and the State have determined that the removal of hotspots of PCB-contaminated soils to an off-site secure landfill and the management and containment of soils/sediments of low PCB contamination in certain areas on-site, and the continued extraction and treatment of contaminated ground water utilizing the existing Ground Water Treatment System, is the most appropriate remedy for the National Southwire Aluminum Site near Hawesville, Hancock County, Kentucky.

L. 1 Summary of the Rationale for the Selected Remedy.

Modified Alternative # 5A achieves a higher level of contaminant removal and containment than Alternative 4, but is more cost-effective than Alternatives # 5B, # 6A, # 6B, and # 6C. The modified Alternative # 5A satisfies all of the nine (9) criteria, including State acceptance and community acceptance. Modified Alternative # 5A satisfactorily addresses each of the five (5) focus areas, plus the two (2) additional Site problems (i.e., the Site-wide ground water extraction and treatment operation, and the Old South Slurry Pond cap/cover maintenance), by either removal or containment of contaminated soils, by imposing specific, limited land use and ground water use deed restrictions and operational controls to limit contact, and by the continuation of the extraction and treatment of contaminated ground water, and the Site-wide monitoring of the extent of ground water contamination. The sixth focus area, Site-wide ground water extraction and treatment, has been expanded by adding (due to State comments on the draft Selected Remedy) an investigation of the soils under the Spent Potliner Accumulation Building (SPAB), because of a concern about probable cyanide contamination of subsurface soils contributing to ground water contamination. See Figure L - 1 for an overview of the seven (7) focus areas.

PCBs are the primary contaminants in certain Site soils and the main focus of this Selected Remedy. PCBs remain of concern because of their bioaccumulative characteristic and the high levels in certain Site areas. 40 CFR 761 provides for three (3) different approaches to the cleanup of PCB-containinated wastes which are not addressed within 72 hours of a spill. These approaches are: 1) performance-based; 2) risk-based; and 3) self-implementing. Use of the performance-based levels would require the removal and disposal of contaminated soil containing a total PCBs concentration greater than or equal to 1.0 ppm. Removal or treatment of all PCB-contaminated Site soils with total PCBs concentrations greater than or equal to 1.0 ppm would be prohibitively expensive as is demonstrated in the consideration and evaluation herein of general Alternative # 6, which is estimated to be ten times more expensive than Alternative # 5A. The risk-based approach requires the development of site-specific, risk-based PCB cleanup levels. Use of a strictly risk-based approach to PCBs cleanup at the Site, based upon the NSA baseline risk assessment and Region IV and State human health and ecorisk evaluations, would effectively be the same as the use of the aforementioned performance-based approach in terms of remediating soils to the less than or equal to 1.0 ppm total PCBs cleanup level. Since the NSA Site is dominated by an operating industrial facility, the self-implementing approach, which is amenable to addressing distinct areas of PCB contamination based upon regulatorily-defined categorical tests, provides the most feasible method of deciding which Site areas are to be remediated to which PCB cleanup levels. Under the self-implementing approach , site areas are categorized as either high occupancy areas or low occupancy areas. Remediation options for each category are provided in 40 CFR 761. The re-categorization of an area from low occupancy to high occupancy, based upon ecological sensitivity, land-use changes, and other considerations, may be accomplished by the Regional Administrator or his delegatee. The self-implementing approach is thus applicable to bulk remediation wastes (defined at 40 CFR 761.61(a)(4)(i)), which include bulk soils contaminated with PCBs, and is implementable at this Site in this instance.

In this case, 'clean fill' has been defined as soils having less than or equal to 1.0 ppm total PCBs. This is the TSCA 'walk-away' cleanup level for uncapped bulk PCB remediation waste soils (one to two feet depth BGL) in high occupancy areas (40 CFR 761.3), such as residential areas or a 40 hours per week work station. For earthen capping soils the 'clean fill' standard is less than or equal to 1.0 ppm PCB per Aroclor (or equivalent) or per congener (40 CFR 761.61(a)(7)). Generally, the USEPA standard for bulk PCB remediation waste in a general industrial setting is 10 ppm total PCBs, while the 'walk-away' cleanup level for capped bulk PCB remediation waste soils in high occupancy areas is concentrations greater than 1.0 ppm and less than or equal to 10 ppm total PCBs (40 CFR 761.61(a)(4)(i)(A)). The cleanup level for bulk PCB remediation waste soils in low occupancy areas (40 CFR 761.3), such as a location in an industrial facility where a worker spends small amounts of time per week or an unoccupied area outside of a building , is less than or equal to 25 ppm total PCBs (40 CFR 761.61(a)(4)(i)(B)(1)). Bulk PCB remediation waste soils may remain on-site in low occupancy areas (40 CFR 761.3) at concentrations greater than 25 ppm and less than or equal to 100 ppm if the area of placement is secured by a fence and marked with warning signs (40 CFR 761.61(a)(4)(i)(B)(2)). Bulk PCB remediation waste soils may remain on-site in low occupancy areas at concentrations greater than 25 ppm and less than or equal to 100 ppm if the area is covered by a cap which meets certain design requirements (40 CFR 761.61(a)(4)(i)(B)(3)). However, 40 CFR 761.61(a)(4)(v) states that if a proposed or actual change in a low occupancy area 's land use is made and the exposure of people or animal life in or at that area could reasonably be expected to increase, then the bulk PCB remediation waste in that area must be cleaned up to the high occupancy area cleanup levels. 40 CFR 761.6l(a)(4)(vi) indicates that the USEPA Regional Administrator, or his/her delegatee, may require cleanup of portions of a site to more stringent levels than are otherwise required in 40 CFR 761.61 based upon proximity to certain sensitive areas such as wetlands and sport fisheries. The NSA facility is in the floodplain (with wetlands) of the Ohio River and the River is a sport fishery, which has already been subject to fish consumption advisories in the past.

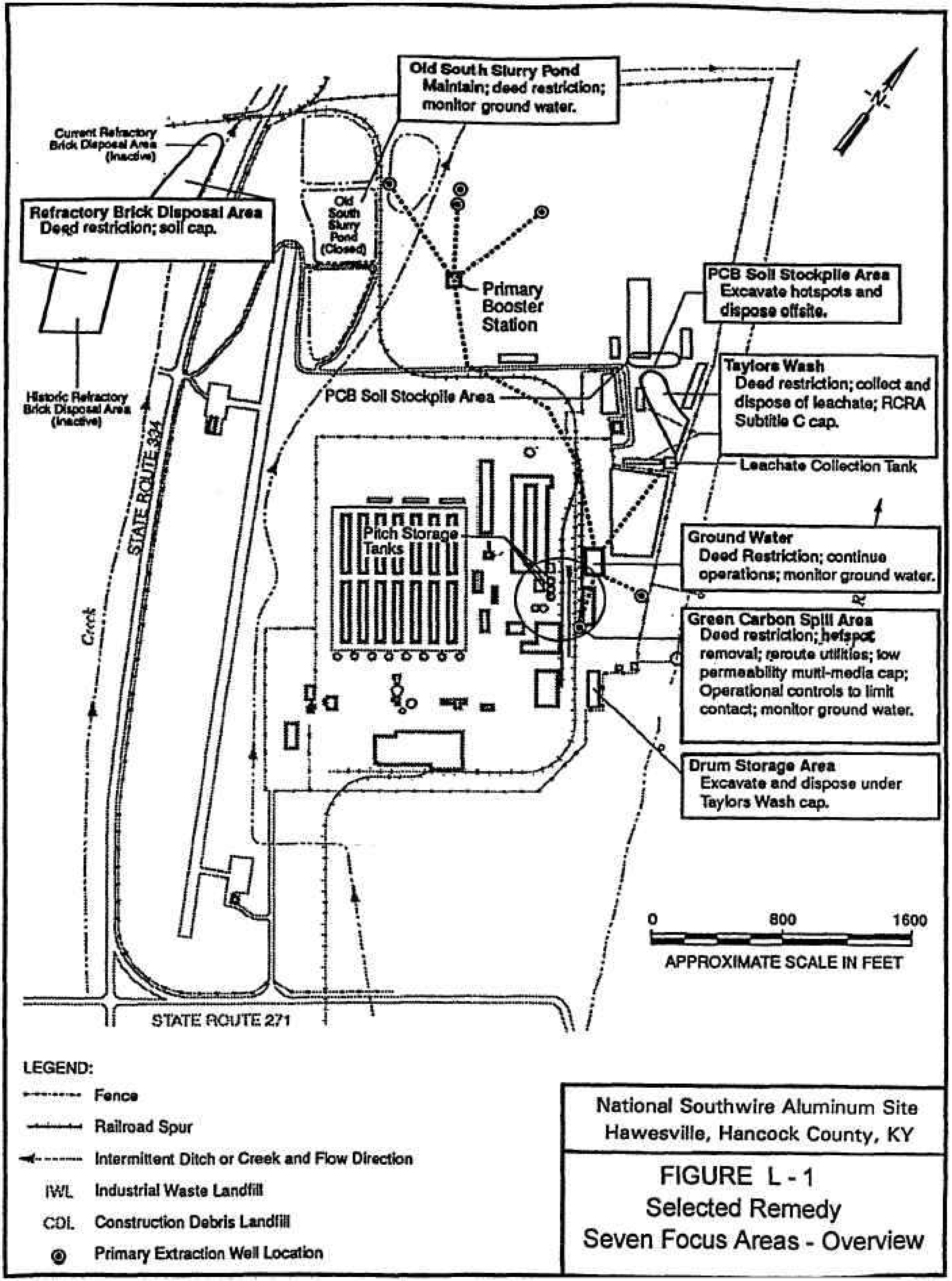
The Green Carbon PCB Spill Area surface may be defined as a high occupancy area due to regular facility activities; the Plant runs 24 hours per day seven days a week. However, the contaminated soils are under an asphaltic or concrete surface treatment and are at total PC concentrations between zero ppm and approximately 8,960 ppm at depth, which effectively places deeper contaminated soils in a normally inaccessible zone, or in a 'low occupancy' location, and shallower surface soils in a more accessible zone, based upon definitions in 40 CFR 761.3. Therefore, if surface soils (one to two feet depth) are cleaned up to less than 25 ppm total PCBs and subsurface soils (greater than two feet depth) are cleaned up to a total PCB concentration less than or equal 100 ppm, and the required cop is installed, than the 40 CFR 761.61 requirements are met. However, it will be infeasible to remove all of the more heavily contaminated subsurface soils from within the Green Carbon PCB Spill Area (where a significant risk of exposure was described by the Human Health Risk Assessment) due to the close proximity of building foundations and underground utilities; therefore, some soils contaminated with total PCBs at the greater than 100 ppm level will be left in place, and containment and monitoring measures undertaken as described in section L.2 below.

The Refractory Brick Disposal Areas (RBDAs) are low occupancy areas which contain soils and debris with low levels of total PCBs generally averaging less than 10 ppm, but being as high as 35 ppm or greater. Therefore, these bulk PCB reinediation wastes in the RBDAs will be fenced and signed; but to reduce the risk of exposure to trespassers and to mitigate potential migration of contaminants an anti-erosion soil cover will be installed. The Drainage Ditch and Muddy Gut Tributary are low occupancy areas , but contain sediments contaminated by run-off from the RBDAs, so the channel sediments will be excavated and disposed into the Taylors Wash Landfill (or disposed off-site in an EPA-approved facility) depending upon the results of sampling and analysis efforts.

The Taylors Wash Landfill is an existing landfill and contains an unknown amount of bulk PCB remediation wastes. The Landfill is a low occupancy area proximal to the Ohio River so under 40 CFR 761.61(a)(4)(i)(B)(3) bulk PCB remediation wastes between 25 and 100 ppm to total PCBs may reside there under a cap. However, since the Landfill is proximal to the River, it is prudent that only bulk PCB remediation wastes with total PCBs concentrations less than 25 ppm be disposed into the Landfill.

The Drum Storage Area is a low occupancy area adjacent and eastsoutheast of the Green Carbon PCB Spill Area; few workers spend much time in the Area on an annual basis. Normally, under 40 CFR 761.61(a)(4)(i)(B)(3) bulk PCB remediation wastes less than or equal to 25 ppm total PCBs may reside in the area as long as the area meets the low occupancy area definition. However, it is probable that the Area may experience a change in land use due to expansion of the NSA facility in the near-term and fencing the Area to severely restrict access is impractical, so 40 CFR 761.61(a)(4)(v) is invoked to remediate the Area's hotspots to the high occupancy area 'walk away' standard of less than or equal to 10 ppm total PCBs.

The PCB Soil Stockpile Area is a low occupancy area and is an area of residual surface PCB contamination north of the Main Plant proximal to Taylors Wash Landfill. The walkaway total PCBs concentration is 25 ppm or less providing the Area is fenced and signed. In this case, the Area surface soils will be scraped and disposed into the Taylors Wash Landfill, and two feet of compacted clean fill will be placed on top of the Area to assure no human contact with the contamination occurs. No fence will be required, but warning signs will be.



National Southwire Aluminum Site
Hawesville, Hancock County, KY

FIGURE L - 1
Selected Remedy
Seven Focus Areas - Overview

Site-wide Ground Water is being addressed by the Interim ROD and ground water extraction, treatment, and discharge is occurring under an RD/RA Consent Decree. The Selected Remedy's addition of unpretreated or pretreated leachate from the Taylors Wash Landfill to the influent of the ground water treatment plant will not modify the KPDES discharge criteria for the ground water treatment plant; PCB concentrations for the discharge have already been determined under the KPDES permit process.

The potential cyanide contamination under the Spent Potliner Accumulation Building has yet to be confirmed by investigation and, even so, does not come under 40 CFR 761.

Old South Slurry Pond Closure/Post Closure activities are already established under a Non-Time Critical Removal Administrative Order on Consent (AOC) and the ensuing Operation and Maintenance Plan (O&M) Plan.

L.2 Description of the Selected Remedy.

A general description of the Selected Remedy is presented in this section. The details of the design for the Selected Remedy will be set forth in the USEPA-approved Final Remedial Design during the Remedial Design and Remedial Action (RD/RA) phases of the Site response.

! General -

• As a part of the facility's general health and safety plan, where appropriate, all facility employees, contractor employees, and visitors shall be informed as to the locations and hazards of the current and former contaminated on-site areas and what precautions to take while working and/or visiting those areas. This procedure shall continue for thirty (30) years after the remedial action construction is complete, unless USEPA and the Commonwealth determine that a different time period is appropriate.

! Green Carbon PCB Spill Area (See Figure L - 2.) -

• In the Green Carbon PCB Spill Area, the extent of which has been previously determined by sampling and analysis to be contaminated by significant levels of PCBs in surface soils (i.e., zero to two (2) foot BGL), the surface treatments i.e., pavement and gravel) will be removed and a proper ground level elevation established. Surface treatment materials will be sampled and disposed on-site or off-site appropriately, or stockpiled for reuse, based upon the results of analyses for total PCBs concentrations. The removed surface treatment materials temporarily stockpiled on-site will be stockpiled in a lined area away from the main plant and a cover maintained over the stockpiles (s) to minimize contaminant migration. Surface treatment materials which have been excavated may not be reused for surface treatment, but may be disposed in the Taylors Wash Landfill.

• Contaminated surface soils from areas between buildings and permanent structures in the Green Carbon PCB Spill Area, and from the area inside the pitch tank secondary containment structure, which are from the established ground level to a depth of two (2) feet, and which contain concentrations of total PCBs greater than 25 ppm, will be excavated and removed for off-site disposal at a USEPA-approved, permitted, disposal facility. Surface soils having total PCBs concentrations of less than 25 ppm may be left in place or used later for subsurface backfill.

• Contaminated soils from areas between buildings and permanent structures in the Green Carbon PCB Spill Area, and from the area inside the pitch tank secondary containment structure, which are from a depth of two (2) feet to a maximum depth of fourteen (14) feet, and which contain 100 ppm or greater concentrations of total PCBs, will be excavated, where best engineering judgement determines that building foundations will not be adversely affected, and removed for <u>off-site disposal</u> at a USEPA-approved, permitted, disposal facility. Temporary stockpiling will be done in a lined area away from the main plant and a secure cover will be maintained over the stockpile to minimize contaminant migration. Excavation in the Green Carbon PCB Spill Area will be undertaken and arranged so that it does not cause structural problems for building foundations and floor slabs. Utilities, both above-ground and below-ground, will be re-routed, where necessary, to accomplish the excavation. Excavation of the soils in the Green Carbon PCB Spill Area may be partitioned and sequenced in order to minimize disruption of regular facility operations.

• As excavation is completed in a specific portion of the Green Carbon PCB Spill Area, soil samples will be collected and analyzed to quantify the concentrations of PCBs remaining in soils in the excavation area. The data will be used in combination with the data from the Remedial Investigation and other Pre-Design Studies to redefine the outer limits of the area where concentrations of total PCBs at or above 10 ppm remain (at the surface) and will define the extent of the Green Carbon PCB Spill Area, the area which will be subject to engineering controls, i.e., the area that will be capped and be subject to access and use controls.

• PCB-contaminated soils and debris temporarily stockpiled on-site shall be stockpiled in a lined area away from the main plant and a secure cover maintained over the stockpiles to minimize contaminant migration.

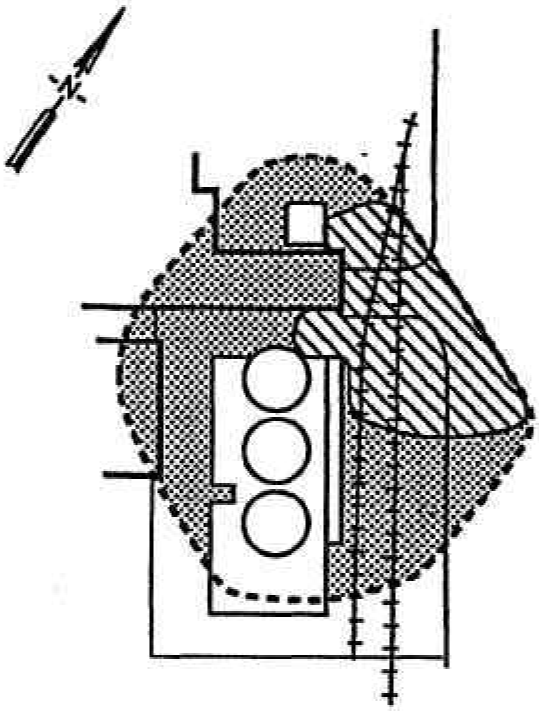
• Upon removal of all specified contaminated soil, subsurface (from two (2) to fourteen (14) feet) backfill shall be made with clean fill. GCPCBS Area final backfill shall be compacted to an appropriate degree prior to the installation of a layer of geotextile material, preferably bentonite matting, and one layer of continuous 30-mil (or thicker) high density polyethylene (HDPE), or equivalent, over the affected area. The affected area will then be re-surfaced with reinforced concrete. Land-use and ground water use deed restrictions will be placed on this specified area.

• Upon completion of the Green Carbon PCB Spill Area construction, a ground water monitoring system shall be installed to detect possible migration of PCBs towards the Ohio River. The monitoring system will consist of at least three (3) monitoring wells installed beyond the eastern limit of the capped Area and screened in the upper stratum of the underlying alluvial aquifer. Locations of these new monitoring wells will be based upon field accessibility, and will be placed as close as practicable to the eastern limit of the capped Area and spaced according to best professional judgement, and approved by USEPA and the Commonwealth. Other existing monitoring wells generally located between the Green Carbon PCB Spill Area and the Ohio River shall be sampled for PCBs and other specified Site Contaminants, according to prior monitoring arrangements made with USEPA and the Commonwealth, unless those arrangements are modified by USEPA and the Commonwealth.

- At the completion of construction in the Green Carbon Area, at least two (2) prominently located and easily understood warning signs shall be installed in the the Area. These signs shall indicate that no excavation (or removal of surface treatments) shall be undertaken in the Area without prior approval of facility environmental engineering management due to the presence of hazardous substances in subsurface soil.
- The official date of construction completion for this Area shall be determined by USEPA and the Commonwealth.

! Refractory Brick Disposal Area (See Figure L - 3.) -

- Land-use and ground water use deed restrictions shall be placed on the Refractory Brick Disposal Area(s) and the other proximal landfills.
- The surface of the RBDAs will be re-contoured by consolidating existing waste material from those Areas and by adding at least two (2) feet of compacted clean fill (i.e., clean fill means less than 1.0 ppm total PCBs), as best professional judgement determines, to achieve a graded surface which will tend to conduct rainfall away from the RBDAs via contouring, swales, and ditches. Once recontoured, the covered RBDAs shall be seeded. The characteristics of the clean fill utilized shall enhance the anti-erosion characteristics of the caps/covers.
- The lengths of the Drainage Ditch and the Muddy Gut Tributary proximal to the RBDAs will have sediments scraped from their bottoms (These lengths to be determined during the Remedial Design.); these sediments will be disposed under the new Taylors Wash Landfill cap/cover after determining the concentrations of PCBs in them. Post-construction confirmatory sampling of Drainage Ditch and Muddy Gut Creek sediments and surface water will be conducted; concurrently, additional post-construction confirmatory sampling of sediments and surface waters at the confluences of the Muddy Gut and the Drainage Ditch and the Ohio River will be done for the purpose of an abbreviated reassessment of the ecological risk at the Site.
- Perimeter chain-link fences with easily understood warning signs shall be installed around the affected RBDAs and landfills. The cover, fences, and warning signage for these areas shall be maintained for a period of thirty (30) years from the date of remedial action construction completion, unless a different time period is determined by USEPA and the Commonwealth. The date of construction completion will be determined by USEPA and the Commonwealth.

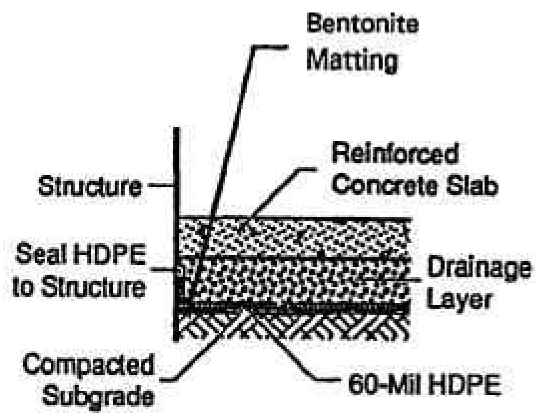


- Reroute utilities, remove railroad tracks.
- Shore selected structures next to planned deep excavations.
- Excavate shallow area to 1- to 2-Foot depth (Approximately 11,000 ft.^{2}).
- Excavate deep area to maximum of 14-foot depth (excavation to be staged to allow continuing operations).
- Backfill.
- Install low-permeability cap in areas with remaining contamination
  * Replace surface treatments as necessary
- Rebuild railroad track.

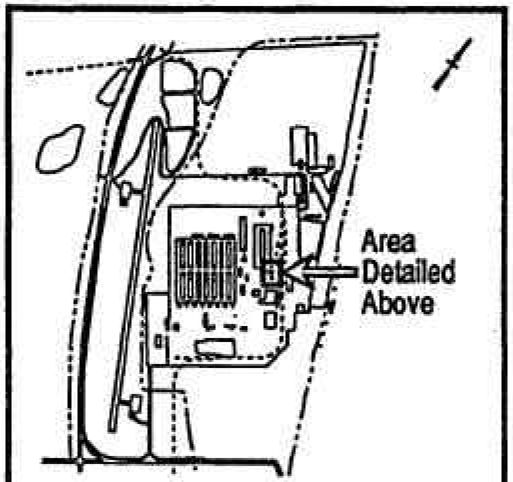
PLAN VIEW
SCALE: 1" = 100'

LEGEND:

- Railroad Spur
- Outer Boundary of 10 mg/kg Concentratio PCBs
- Area of Deep Hotspot Excavation
- Area of Shallow Hotspot Excavation



- Install cap in areas with remaining contamination.



Site Map
Not to Scale

National Southwire Aluminum Site
Hawesville, Hancock County, KY

FIGURE L - 2
Selected Remedy
Green Carbon PCB Spill Area

! Taylors Wash Landfill (See Figure L - 4.) -

• Land-use deed restrictions shall be imposed on the Taylors Wash Landfill; Site-wide ground water use deed restrictions, will be applied.

•The extent of the Landfill will be redetermined using data from the Remedial Investigation and Pre-Design Studies, and additional sampling, if necessary.

• The existing downpipe/sump system at the Landfill will be upgraded/replaced, if necessary. A submersible pump system of appropriate design and specifications shall be placed into the existing or redesigned sump and a double-wall force main and booster station, if necessary, shall be designed and built to safely convey Landfill leachate to the existing Ground Water Treatment Plant for mixture and treatment with other extracted ground waters. The Ground Water Treatment Plant may need process augmentation in order to pre-treat Taylors Wash Landfill leachate before the leachate is mixed with extracted ground water. A treatability study will be performed to determine the necessity and particulars of pre-treating leachate before it is mixed with extracted ground water.

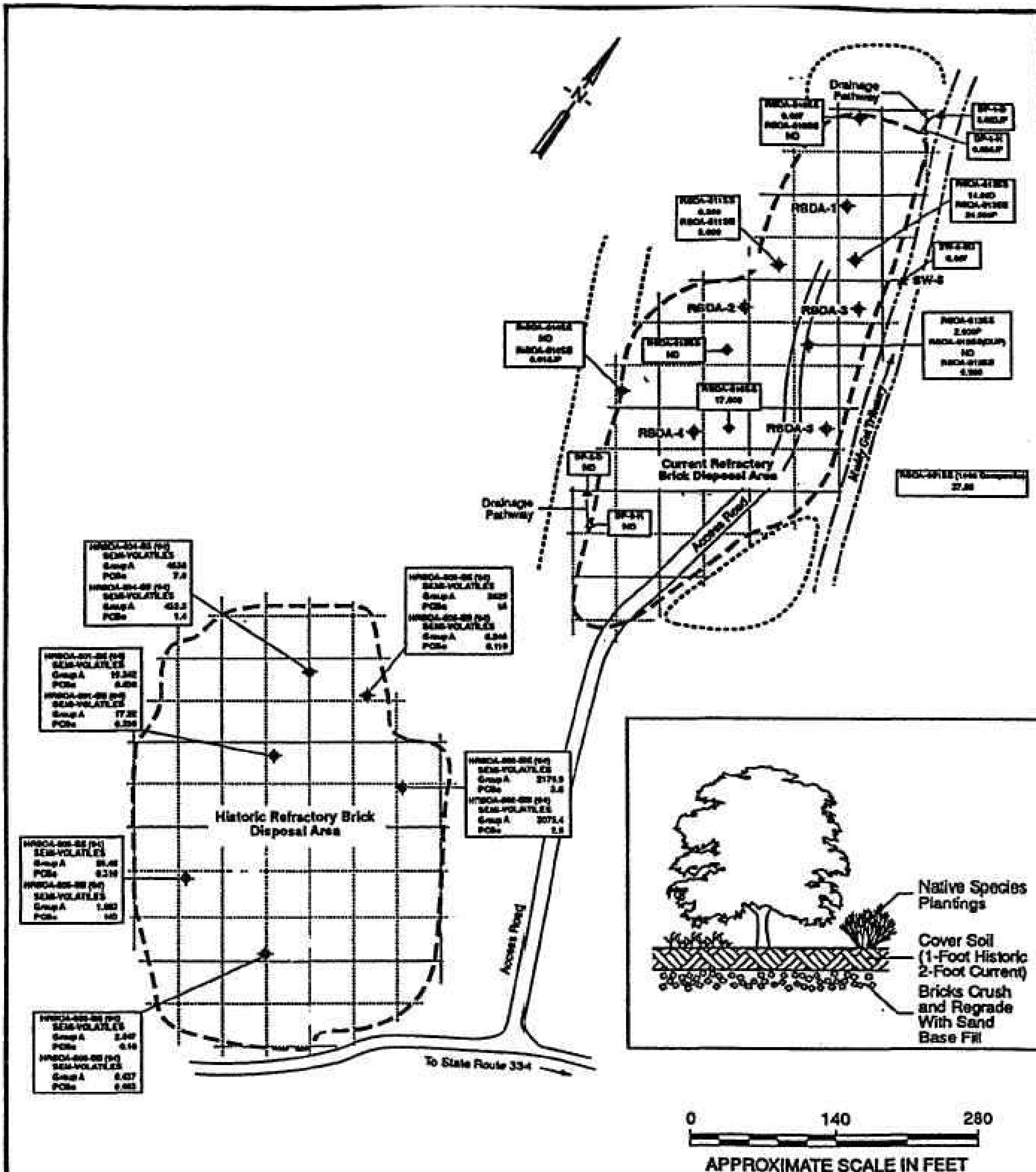
• Low concentration PCB-contaminated soils and surface treatment materials from the Green Carbon PCB Spill Area, the Drum Storage Area, the PCB Soil Stockpile Area, and any other on-site areas, except the Refractory Brick Disposal Areas, will be either consolidated in the Taylors Wash Landfill or disposed in an off-site, USEPA-approved, permitted, disposal facility. A USEPA- and Commonwealth-approved RCRA-type Subtitle D cap and cover (See 40 CFR 264.310(a) and 40 CFR 761.75(b)(1)(ii) through (b)(1)(v).) will be constructed over the Landfill. The cap and cover system will be contoured and graded to efficiently convey rainfall off of the cap. The Landfill will be fenced and signed.

• The cap, cover, fences, and signs shall be maintained for at at least thirty (30) years from date of remedial action construction completion, unless a different time period is determined by USEPA and the Commonwealth. The date of construction completion will be determined by USEPA and the Commonwealth.

! Drum Storage Area -

• The extent of the Area will be redetermined using data from the Remedial Investigation and Pre-Design Studies, and additional sampling, if necessary.

• Contaminated soils with one (1) ppm or greater, but less than 10 ppm, total PCBs will be identified, excavated, and disposed under the new Taylors Wash Landfill cap. Contaminated soils with 10 ppm or greater total PCBs will be disposed off-site in a secure, permitted, USEPA-approved hazardous waste disposal facility. Contaminated soils with 10 ppm or greater of benzo(a)pyrene will be disposed in the Taylors Wash Landfill. Clean fill (i.e., less than 1.0 ppm total PCBs and less than 10 ppm benzo(a) pyrene) and new surfacing will be placed over the affected areas.



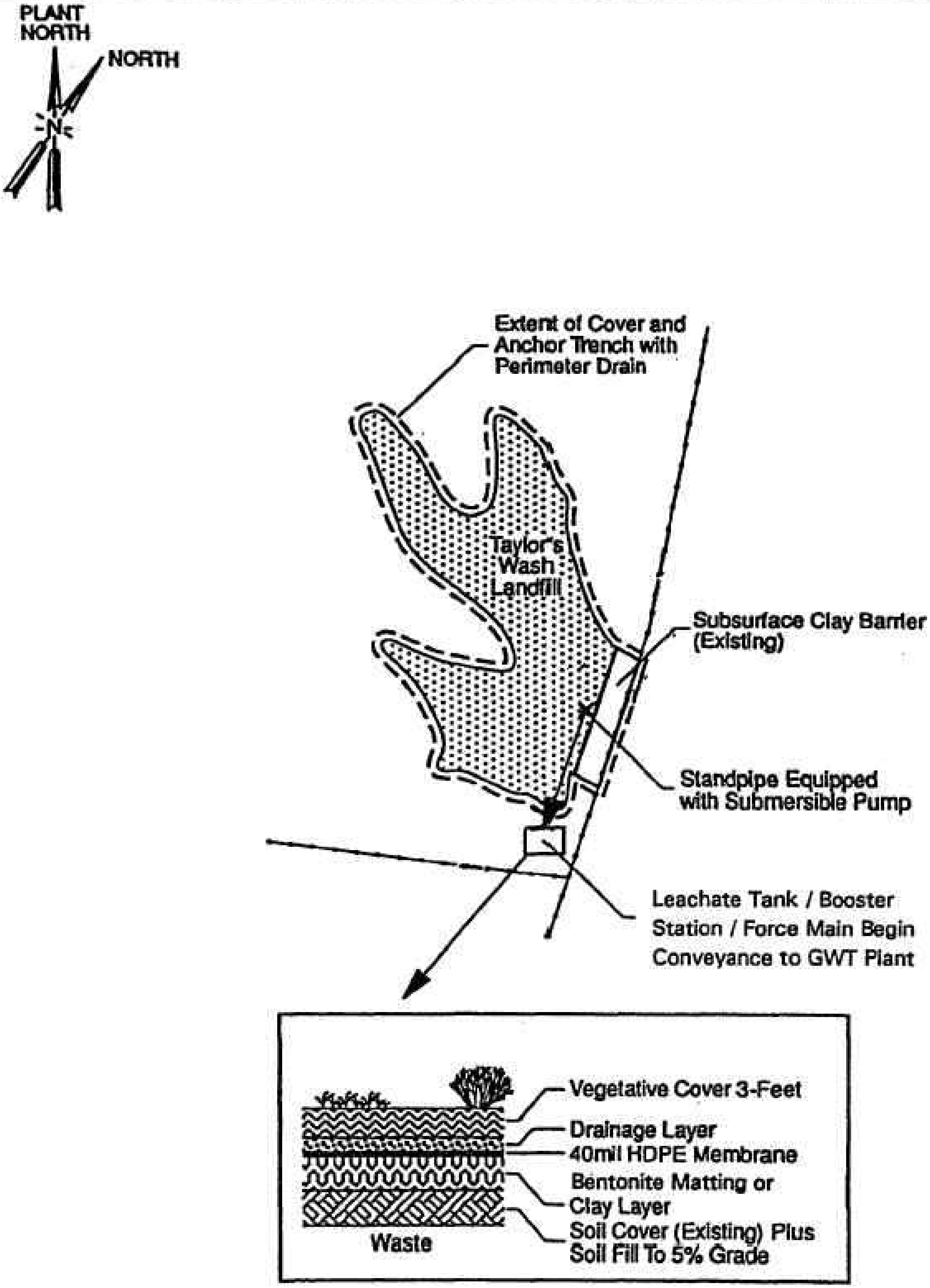
LEGEND:

- - - Approximate Boundary and Fence Line of RBDA

.... Surface Water Feature

National Southwire Aluminum Site
Hawesville, Hancock County, KY

FIGURE L - 3
Selected Remedy
Refractory Brick Disposal Areas



LEGEND:

Fence

Industrial Waste Landfill

National Southwire Aluminum Site
Hawesville, Hancock County, KY

FIGURE L - 4
Selected Remedy
Taylors Wash Landfill

! PCB Soil Stockpile Area -

- The extent of the PCB Soil Stockpile Area shall be redetermined by using data from the Remedial Investigation and Pre-Design Studies, and additional sampling, if necessary.
- Contaminated soils with greater than one (1) ppm, but less than or equal to 10 ppm total PCBs shall be identified, excavated, and disposed under the new Taylors Wash Landfill cap.
- A two (2) feet thick layer of clean fill (i.e., less than 1.0 ppm total PCBs) shall be constructed over the PCB Soil Stockpile Area and seeded. The Area shall be identified with easily understood warning signs. The sign(s) shall be maintained for thirty (30) years from the date of remedial action construction completion, unless that time period is modified by USEPA and Commonwealth determination.

! Site-Wide Groundwater -

- As a part of the specific, limited land-use, deed restriction package, the use of on-site ground water from under the main production facility and from within and near the ground water contamination plumes identified during the Remedial Investigation shall be restricted. Use of unaffected proximal properties for agricultural purposes is not deed-restricted. Additional environmental restrictions on land use in these areas is not necessary based on current information, and, if imposed, would likely adversely impact any land use agreements (e.g., leases) currently in effect. However, persons leasing and/or using these properties for agricultural or other purposes will be advised as to the environmental history of the NSA Site.
- The existing Ground Water Treatment Plant shall continue to be operated according to the conditions set forth in the 1994 RD/RA Consent Decree and the existing KPDES discharge permit for the Ground Water Treatment Plant. The addition of Taylors Wash Landfill leachate (as described above) to the Ground Water Treatment Plant influent shall not change the KPDES discharge limits for the constituents of concern under the KPDES permit.
- On-site ground water shall continue to be monitored according to prior arrangements with USEPA and the Commonwealth, unless otherwise modified by USEPA and the Commonwealth.
- In order to bring the Spent Potliner Accumulation Building (SPAB) into compliance with RCRA and 401 KAR 34:070 and to address a potential ground water protection problem, soil sampling will be performed under the concrete floor of the SPAB by coring through the concrete slab and by taking grab samples at the zero feet to one foot soil depth interval and at the one foot to two feet soil depth interval. One coring per each twenty (20) feet by twenty (20) feet grid of the Building floor will be accomplished. The subsurface soil samples will be analyzed for total cyanide. If cyanide contamination at or above risk-based levels is discovered underneath the Building, the PRP will propose a remediation option consistent with 401 KAR 34:070 during the Remedial Design phase; USEPA and the Commonwealth must approve of the proposed remediation option prior to that option being implemented.

! Old South Pond Closure / Post Closure -

• The cap and cover on the Old South Slurry Pond shall be maintained according to the existing Operation and Maintenance Plan for the Pond. The O & M of the cap and cover system for the Pond shall continue for thirty (30) years after the remedial action construction completion, unless that time period is modified by USEPA and Commonwealth determination.

• Land-use and ground water use deed restrictions for the Pond shall include all four (4) slurry/disposal ponds, whether they are active or closed.

• Ground water in the area of the Pond shall continue to be monitored according to prior arrangements with the USEPA and the Commonwealth, unless those arrangements are modified by USEPA and the Commonwealth.

L.3 Summary of the Estimated Remedy Costs.

The information in the following cost estimate summary table (Table L-1) is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

L.4 Expected Outcomes of the Selected Remedy

The total estimated carcinogenic risks based on reasonable maximum exposures (RMEs) in the Main Processing Area, including the Green Carbon PCB Spill Area, are estimated to be from 1×10^{-6} to 7×10^{-6} which is near the lower end of the 1×10^{-4} to 1×10^{-6} risk range which USEPA considers as the point of departure for remediation. The KDEP has expressed a preference for a standard of 1×10^{-6} or less. The 7×10^{-6} total carcinogenic risk figure is associated with inhalation-of-soils exposure by Adult Maintenance Workers in the Green Carbon PCB Spill Area and the Drum Storage Area. The above-described remediation of the Green Carbon PCB Spill Area and the Drum Storage Area is designed to lower the total carcinogenic risk (based on RME levels and on TSCA policy-based PCB cleanup levels) at least two (2) orders of magnitude below the 1×10^{-6} level. Removal and off-site disposal of more heavily contaminated soils from the Green Carbon PCB Spill Area and other areas.

TABLE L - 1 : COST SUMMARY ALTERNATIVE 5A (Modified) : Hotspot Removal and Containment - Off-Site Landfill Disposal				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. Capital Cost				
Green Carbon Area				
Deed Restriction	each	$500	1	$500
GW Monitoring & Operational Controls (Existing)	well	$3,000	0	$0
Reroute Utilities	total	$331,000	1	$331,000
Excavate Hotspots and Dispose Off-Site	total	$2,973,000	1	$2,973,000
Low Permeability Multi-Media Cap	total	$601,000	1	$601,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Soil / Erosion Cap	total	$535,000	1	$535,000
Tavlors Wash				
Deed Restriction	each	$500	1	$500
RCRA Cap (KY contained landfill plus one layer)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap		$9,000	1	$9,000
PCB Soil Stockpile Area				
Deed Restriction	each	$500	1	$500
Soil Erosion Cap	estimate	$60,000	1	$60,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Continue Operations (existing)		$0	1	$0
Groundwater Monitoring		$0	1	$0
Subsurface soil investigation under building slab of Spent Potliner Accumulation Building	each	$30,000	1	$30,000
South Pond Closure / Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care		$0	1	$0
			Capital Cost Subtotal	$5,804,000
			Miscellaneous (25 % of Subtotal)	$1,451,000
			Engineering (20 % of Subtotal)	$1,160,800

	Contingency (30 % of Subtotal)			$1,741,200
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$10,157,000
	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation				$12,607,000
II. Annual O and M Cost				
Operational Controls - Green Carbon	nominal	$5,000	1	$5,000
Paving Repair - Green Carbon	nominal	$1,000	1	$1,000
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
	Annual O and M Subtotal			$687,500
	Miscellaneous (25 % of Subtotal)			$171,875
	Engineering (20 % of Subtotal)			$137,500
	Contingency (30 % of Subtotal)			$206,250
Total Annual O and M Cost				$1,203,125
III. Summary of Costs				
Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation				$12,607,000
Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation				$10,157,000
Total Annual O and M Cost				$1,203,125
Total Present Worth Cost (<u>Less</u> Cost of GWTS and OSSP Remediation)				$25,115,736

SUMMARY OF PRESENT WORTH CALCULATIONS - Modified Alternative 5A					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Cost**	**Discount Factor (7 %)**	**Present Worth**
0	$10,157,000		$10,157,000	1.00	$10,157,000
1		$1,203,125	$1,203,125	0.935	$1,124,922
2		$1,203,125	$1,203,125	0.873	$1,073,899
3		$1,203,125	$1,203,125	0.816	$981,750
4		$1,203,125	$1,203,125	0.763	$917,984
5		$1,203,125	$1,203,125	0.713	$857,828
6		$1,203,125	$1,203,125	0.666	$801,281
7		$1,203,125	$1,203,125	0.623	$749,547
8		$1,203,125	$1,203,125	0.582	$700,219
9		$1,203,125	$1,203,125	0.544	$654,500
10		$1,203,125	$1,203,125	0.508	$611,188
11		$1,203,125	$1,203,125	0.475	$571,484
12		$1,203,125	$1,203,125	0.444	$534,188
13		$1,203,125	$1,203,125	0.415	$499,297
14		$1,203,125	$1,203,125	0.388	$466,813
15		$1,203,125	$1,203,125	0.362	$435,531
16		$1,203,125	$1,203,125	0.338	$406,656
17		$1,203,125	$1,203,125	0.316	$380,188
18		$1,203,125	$1,203,125	0.296	$364,117
19		$1,203,125	$1,203,125	0.277	$333,266
20		$1,203,125	$1,203,125	0.258	$310,406
21		$1,203,125	$1,203,125	0.242	$291,156
22		$1,203,125	$1,203,125	0.226	$271,906
23		$1,203,125	$1,203,125	0.211	$253,859
24		$1,203,125	$1,203,125	0.197	$237,016

25		$1,203,125	$1,203,125	0.184	$221,375
26		$1,203,125	$1,203,125	0.172	$206,938
27		$1,203,125	$1,203,125	0.161	$193,703
28		$1,203,125	$1,203,125	0.150	$180,469
29		$1,203,125	$1,203,125	0.141	$169,641
30		$1,203,125	$1,203,125	0.131	$157,609
TOTALS	$10,157,000	$36,093,750	$46,250,750		$25,115,736
Total Present Worth Cost					$25,115,736

M. STATUTORY DETERMINATIONS

Under CERCLA section 121, the lead agency must select remedies that are (1) protective of human health and the environment, (2) comply with applicable or relevant and appropriate requirements (ARARs) (unless a statutory waiver is justified), are (3) cost-effective, and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes (5) a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principle element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

M.1 Protection of Human Health and the Environment

The Selected Remedy, modified Alternative # 5A, will adequately protect human health and the environment by means of removal, consolidation, containment, engineering controls, maintenance, periodic monitoring, and institutional controls according to NCP §300.430(f)(5)(ii). The Selected Remedy will eliminate, reduce, or control existing and potential risks. The removal of soils heavily contaminated with PCBs to an off-site, secure, permitted, USEPA-approved hazardous waste disposal facility will significantly decrease potential long-term exposures. Soils with less contamination will be contained on-site in the Taylors Wash Landfill where a new RCRA Subtitle D cap/cover and a leachate recovery and treatment system will reduce long-term risks to human health and the surrounding environment. Other specific focus areas will be capped, covered, fenced, signed, maintained, and periodically monitored. Continued extraction and on-site treatment of ground water, Taylors Wash Landfill leachate, contaminated with cyanide, fluoride, PCBs and metals, will mitigate long-term risks associated with potential ground water contamination exposures. The implementation of the Selected Remedy will not pose unacceptable or unreasonable short-term risks or significant cross-media impacts which may present a human health risk and will reduce the potential exposures which are driving the main carcinogenic risks at the Site. The capping and fencing of the Taylors Wash Landfill and the collection and treatment of its leachate will reduce the potential exposures which may result from migration of contaminants to the Ohio River.

M.2 Compliance with ARARs

The Selected Remedy, modified Alternative # 5A, generally consists of (1) consolidation, containment, and monitoring of soils of lower level PCB-contamination, (2) removal of PCB-contaminated soils with higher concentrations to an off-site, USEPA-approved, secure hazardous waste disposal facility, and (3) continued extraction and on-site treatment of ground water contaminated with cyanide, fluoride, and metals, complies with ARARs. The ARARs are presented below and in more detail in Tables M-1, M-2, and M-3.

Chemical, Location, and Action-Specific ARARs include the following:

The major chemical-specific ARAR for PCB-contaminated soils and sediments is 40 CFR 761, Disposal of Polychlorinated Biphenyls (PCBs). Intra Part 761 focuses are on 761.3 (Definitions) and 761.61 (PCB remediation waste). 40 CFR 761 applies directly to the remediation of PCB-contaminated soils of the Green Carbon PCB Spill Area, the Refractory Brick Disposal Areas (including the Drainage Ditch and the Muddy Gut Tributary), the PCB Soil Stockpile Area, the Taylors Wash Landfill, and the Drum Storage Area. Additional chemical-specific ARARs are found in section 9.2.3 (Contaminant Specific ARARs), page 50, of the February 19, 1993 Interim ROD.

The major location-specific ARAR is 40 CFR 264.18 (Floodplain Management), which mandates that hazardous waste treatment, storage or disposal facilities located within a 100-year floodplain must be designed, constructed, operated, and maintained to avoid washout. This regulation is applicable because a large portion of the Site is located within the 100-year floodplain of the Ohio River. Also an ARAR is 40 CFR 6.302 (Floodplain Management Executive Act [Executive Order 11988]), which dictates that actions in floodplains are required to avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values. Location-specific ARARs are found in section 9.2.2 (Location Specific ARARs), page 50, of the February 19, 1993 Interim ROD.

The major action-specific ARAR for this remedial action is 40 CFR 761.61 (PCB remediation waste) which describes the necessary conditions for the on-site excavation, disposal, and containment of PCB remediation waste soils/sediments, including reference to the cap requirements in 40 CFR 264.310, i.e., RCRA cap requirements. Also an ARAR is Kentucky's 40 KAR 5, Parts 031, 065, and 075, the Kentucky Pollutant Discharge Elimination System (KPDES, which reflects the NPDES), which applies to the existing GWTS discharge as well as the discharge that is to occur after leachate from the Taylors Wash Landfill is included in the GWTS influent. Additionally, ARARs include KRS 151.140 (Withdrawal of public waters from within the Commonwealth), 401 KAR 5:005 (Kentucky's Waste Water Treatment Plant Design Criteria), and KRS 224.01-400 (Hazardous Substance Remediation Provisions), which are set forth in the February 19, 1993 Interim ROD, section 9.2.1, pages 49-50.

M.3 Other Criteria, Advisories, or Guidance To-Be-Considered (TBCs) for This Remedial Action.

In implementing the Selected Remedy, USEPA and the Commonwealth have agreed to consider a number of non-binding criteria that are TBCs. The TBCs are described in Tables M-4, M-5, and M-6.

TABLE M - 1 CHEMICAL-SPECIFIC ARAR's			
LAW / LIMITATION OR STANDARD	**STATUTE, REGULATION**	**DESCRIPTION**	**COMMENT**
MEDIUM: GROUND WATER/ SURFACE WATER			
FEDERAL			
Safe Drinking Water Act (SDWA)	42 USC Section 300(g)		
National Primary Drinking Water Standards	40 CFR, Part 141.11-141.16	Enforceable standards for public drinking water systems.	Maximum, Contaminant Levvels (MCLs). MCLs are relevant at points of use or intake.
STATE			
Kentucky Regulations for Public Water Supply	401 KAR Chapter 8	Standards for public drinking water systems.	MCLs relevant at points of use or intake.
Kentucky Water Quality Regulation (Surface Water)	401 KAR Chapter 5	Establishes water pollution control program and KPDESD program for discharge of industrial wastewater to Kentucky waters.	Water quality standards for surface water.
Kentucky Environmental Performance Standards	401 KAR 30:031	Minimum environmental preformance for waste sites.	MCLs for ground water.
MEDIUM: SOIL			
FEDERAL			
TOXIC SUBSTANCES CONTROL ACT	40 CFR Part 761	Regulations concerning PCB use and disposal	Soil cleanup standard of 25 ppm PCBs for restricted areas. 1 ppm surface, 10 ppm subsurface for unrestricted areas.
Hazardous Waste Disposal regulations	63 FR 28556 May 26, 1998	Land disposal regulations for soils contaminated with hazardous waste.	
STATE			

TABLE M - 1 CHEMICAL-SPECIFIC ARAR's			
Kentucky Environmental Performance Standards	KRS 224.01-400	Characterization and remediation obligations with respect to releases of hazardous substances.	Risk-based cleanup standards.
MEDIUM: AIR			
FEDERAL			
Clean Air Act (CAA)			
Standard of Performance for New Stationary Sources	40 CFR 60, State counterpart 401 KAR Chapter 59, 60	Establishes general provisions and performance standards for stationery sources of air emissions, constructed/modified since 1980.	May effect treatment actions.
National Ambient Air Quality Standards (NAAQS) & NAAQA for Total Suspended Particulate Matter	40 CFR 50.6	Defines levels of air quality necessary to protect human health. Specifies maximum 24-hr. ambient concentrations for particulate matter.	Standards establised for criteria pollutants. Fugitive dust emissions from site excavation activities must be maintained below 150 ug/m3.
CAAA Section 112 National Emission Standards for Hazardous Air Pollutants (NESHAP)	40 CFR 61	National Emission Standards for Hazardous Air Pollutants	
STATE			
Kentucky Regulations for Air Quality			
Ambient Air Quality	401 KAR Chapter 53	Establishes air quality standards	
Toxic Air Pollutants	401 KAR Chapter 63:020		

TABLE M - 2 LOCATION-SPECIFIC ARAR's			
LAW/ LIMITATION OR STANDARD	**STATUTE, REGULATIONS**	**DESCRIPTION**	**COMMENT**
FEDERAL			
Fish and Wildlife Coordination Act	16 USC 661-666C 40 CFR Section 6.302 (g)	Requires that U.S. Fish and Wildlife Service be consulted prior to the midification of any body of water to ensure that fish and wildlife resources are adequately protected.	
Clean Water Act	33 USC Sections 1251-1376 Section 404 of CWA 33 CFR 320-330	Requires that the potential effects of remedial actions on wetlands be evaluated and that no activity that adversely affects a wetland be promoted if a practical alternative that has less effect is available. Also addresses stream construction, dredge and fill.	
STATE			
Kentucky Water Resources Regulations	401 KAR Chapter 4 KRS Chapter 151	Regulations of floodplain development, stream construction.	May effect some remedial actions in the statutory floodplain.
Kentucky Environmental Performance Standards	401 KAR 30:031	Minimum environmental performance for waste sites.	No waste site shall restrict the flow of the 100 year flood or reduce water storage capacity.
Groundwater Protection Plan Regulation	401 KAR 5:037	Requirements for ground water protection	As above.

TABLE M - 3 ACTION-SPECIFIC ARAR's			
LAW/ LIMITATION OR STANDARD	**STATUTE, REGULATIONS**	**DESCRIPTION**	**COMMENT**
FEDERAL			
Resource Conservation and Recovery Act	42 USC Sections 6901-6987 40 CFR Parts 261-265, 268 18 CFR Part 430	Establishes standards for remedial actions that include on-site storage and off-site hauling and disposal of hazardous wastes, on-site capping and landfilling, and post-remediation groundwater monitoring.	May affect treatment options.
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	Establishes standards for emission of hazardous air pollutants including vinyl chloride.	
Occupational Safety and Health Act	29 USC 651-678	Regulates worker health and safety.	May apply to pilot testing and remedial activities.
Clean Water Act (CWA)	33 USC 1251-1376		
Effluent Limitations	33 USC Section 1311	Technology-based discharge limitations for point sources of toxic pollutants.	May affect treatment options.
Water Quality Related Effluent Limitations	33 USC Section 1312	Protects intended uses of receiving water (e.g., public water supply, recreation).	May affect treatment options.
Toxic and Pretreatment Effluent Standards	33 USC Section 1317	Establishes list of toxic pollutants and promulgates pretreatment standards for their discharge into POTWs.	May affect treatment options.
National Pollutants Discharge Elimination System (NPDES)	33 USC Section 1342	Issues permits for discharge into navigable waters.	Only off-site discharges would be required to obtain a permit.
Hazardous Material Transportation Act	49 USC Sections 1801-1813 49 CFR 172,173, 177,	Regulates transportation of hazardous materials.	As above. On-site CERCLA activities are exempt for obtaining permit under SARA (Section 121)
STATE			

TABLE M-3 ACTION-SPECIFIC ARAR's			
Kentucky Hazardous Waste Regulations	401 KAR Chapter 30-40	Establishes standards for generators, transporters, TSD facilities and permitting, for hazardous waste.	
Kentucky Solid Waste Regulations	401 KAR Chapter 47 & 48	Establishes classifications standards for non-hazardous waste facilities.	
Kentucky Air Regulations	401 KAR Chapter 50-65	Regulations for new source permitting.	Applicable to permitting for treatments involving incineration/thermal only.
Kentucky Water Quality Regulations	401 KAR Chapter 5	Establishes program for industrial discharges to waters of the State.	Applicable to treatment involving water treatment and discharge.
Kentucky Water Well Practices and Standards	401 KAR 6:310 & 320	Establishes standards for water well construction and licensing for drillers.	Applicable to monitoring wells and extraction well construction, maintenance, and abandonment.
Kentucky Groundwater Protection Planning	401 KAR 5:037	Requirements for groundwater protection.	

TABLE M - 4 CHEMICAL-SPECIFIC TBC'S			
LAW/ LIMITATION OR STANDARD	**STATUTE, REGULATIONS**	**DESCRIPTION**	**COMMENT**
MEDIUM: GROUNDWATER AND SURFACE WATER			
FEDERAL			
Safe Drinking Water Act (SDWA)			
Maximum Contaminant Level Goals (MCLGs)	40 CFR Section 141.50-141.51	Non-enforceable health goals for public drinking water systems.	
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes welfare-based standards for public drinking systems.	Primary taste and color.
Clean Water Act (CWA)	33 USC Sections 1251-1376		
Water Quality Standards	40 CFR Part 131 56 FR 13593 56 FR 64893	Non-enforceable water quality criteria based on the toxicity of the contaminant to aquatic organisms and human health.	
Maximum Contaminant Level Goals (MCLGs)	40 USC Section 300 40 CFR Part 141.2	A non-enforceable level of a drinking water contaminant at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety.	
STATE			
None.			
MEDIUM: SOIL			
FEDERAL			
Identification and Listing of Hazardous Waste	40 CFR Part 261	Defines those solid wastes which are subject to regulation as hazardous wastes.	This may be applicable for some materials handled on-site.

TABLE M - 4 CHEMICAL-SPECIFIC TBC'S			
Hazardous Waste Management Standards	40 CFR Parts 262-265, 124, 270, and 271		
<u>STATE</u>			
Identification and Listing of Hazardous Waste	401 KAR Chapter 31	Defines those solid wastes subject to Kentucky hazardous waste regulations.	Kentucky has primacy for hazardous waste regulations.

TABLE M - 5 LOCATION-SPECIFIC TBC's			
LAW/ LIMITATION OR STANDARD	**STATUTE, REGULATIONS**	**DESCRIPTION**	**COMMENT**
FEDERAL			
Executive Order on Management			
Flood Plain Management	Executive Order No. 11988 50 CFR Section 6:302(b), Appendix A	Requires that remedial actions avoid the adverse impacts associated with direct and indirect development of a floodplain.	
Wetland Protection	Executive Order No. 11990 40 CFR Section 6:302(a), Appendix A	Requires that remedial actions avoids the adverse impacts associated with direct and indirect development of wetlands.	

TABLE M - 6 ACTION-SPECIFIC TBC's			
LAW/ LIMITATION OR STANDARD	**STATUTE, REGULATIONS**	**DESCRIPTION**	**COMMENT**
FEDERAL			
USEPA Groundwater Protection Strategy	USEPA Policy Statement, August 1984	Identify groundwater quality to be achieved during remedial actions based on the aquifer characteristics and use.	
Interim RCRA/CERCLA Guidance of Non-Contiguous Sites Management of Waste and Treated Residue	USEPA Policy Statement, March 27, 1986	If a treatment or storage unit is to be constructed for an on-site remedial action, there should be a clear intent to dismantle, remove, or close the unit after the CERCLA action is completed.	
USEPA Revised Off-Site Policy	EPA OSWER Directive 9834.11, November 13, 1987	Prohibits the off-site disposal of Superfund waste at a facility not in compliance with Section 3005 of RCRA and all applicable State requirements.	May be applicable to long-term groundwater remediation.
USEPA Monitored Natural Attenuation Policy	OSWER Directive 9200.4-17	Provides guidance on use of monitored natural attenuation for remediation.	
USEPA Technical Impracticability of Groundwater Restoration Policy	OSWER Directive 9234.2-25	Provides guidance on Remedial Strategies for sites where groundwater cleanup goals may not be technically feasible.	

M.4 Cost-Effectiveness

In the lead agency's judgement, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (40 CFR 300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three (3) of the five (5) balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this represents a reasonable value for the money to be spent.

For this site, Alternatives # 1 and # 2 were not considered to be cost-effective as they would not result in any reduction in toxicity, mobility, or volume of wastes at the site nor would they be effective in the long-term at reducing site risks in a permanent manner. Alternatives # 4 and # 5 were both determined to be cost-effective. In evaluating the cost-effectiveness of these alternatives, the decisive factors considered were the timeframe required to construct the remedy and the timeframe in which the remedial goals will be achieved. USEPA believes that the additional money required to implement Alternative # 6 does not merit the overall effectiveness of that alternative and that Alternative # 5 (the Selected Remedy) represents the better value for the money to be spent.

M.5 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP).

USEPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and which comply with ARARs, USEPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five (5) balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal, and considering State and community acceptance.

The Selected Remedy, modified Alternative # 5A, removes and contains the source materials constituting principal threats at the Site, achieving a significant risk reduction. The Selected Remedy satisfies the criteria for long-term effectiveness by removal of heavily contaminated soils to a USEPA-approved disposal facility for proper long-term containment, and by on-site containment of lightly contaminated soils/sediments. Long-term imposition of land-use and ground water use deed restrictions at this industrial facility ensures constraints on future land-use changes from industrial use to residential use and from TSCA-defined low occupancy uses to high occupancy uses. The Selected Remedy does not present short-term risks significantly different from the other treatment alternatives. Chief short-term risks reside with on-site workers involved in the actual Superfund remediation activities. There are no special implementability issues that set the Selected Remedy apart from any of the other alternatives evaluated, other than the requirement for problematic excavation in the Green Carbon PCB Spill Area.

M.6 Preference for Treatment as a Principal Element.

The Selected Remedy addresses principal threats posed by the Site through the use of conventional environmental remediation technologies, such as excavation and off-site disposal of more heavily contaminated soils, containment of remaining lesser contaminated soils, and exposure reduction by means of capping and covering, fencing, signing, and leachate extraction and treatment. The leachate from Taylors Wash Landfill will be extracted and treated in the existing Ground Water Treatment System. On-site and off-site thermal treatment of more heavily contaminated soils was not acceptable to the community, and was considered cost prohibitive by NSA. Thus, after considerable evaluation and analysis, the soils are not being treated, but the leachate from the Taylors Wash Landfill is being treated.

M.7 Five-Year Review Requirements.

Section 121 (c) of CERCLA, as amended, and the NCP provide the statutory and legal bases for conducting five year reviews. If there are any hazardous substances, pollutants, or contaminants remaining at the Site above levels that would allow unlimited use and unrestricted exposure, USEPA shall conduct a review of such remedial action no less often than each five (5) years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In general, a five-year review covers all operable units at a site. If a site has multiple operable units (OU), the triggering event for a statutory review is the initiation of remedial action at the first OU at which substances will remain above levels that allow for unlimited use and unrestricted exposure after completion of the remedial action.

Statutory reviews are triggered by the initiation of the remedial action. USEPA will conduct a statutory review of any site at which a post-SARA remedy, upon attainment of cleanup levels, will not allow unlimited use and unrestricted exposure. Examples of sites whose remedy would include: landfills, natural attenuation, institutional controls, technical impracticability waivers, capping, would require a statutory review. For statutory reviews, initiation of remedial action is determined by the “actual RA on-site construction “ date. Statutory reviews cannot be discontinued. In other words, if the remedy upon completion will not meet health-based standards, such as chemical-specific applicable or relevant and appropriate requirements (ARARs), five- year reviews cannot be discontinued.

Policy reviews are triggered by construction completion. USEPA will conduct a policy review of (1) sites where no hazardous substances will remain above levels that allow unlimited use and unrestricted exposure after completion of the remedial action, but the cleanup levels specified in the Record of Decision (ROD) will require five (5) or more years to attain (e.g., long-term remedial action,sites); and (2) pre-SARA sites at which the remedy, upon attainment of the ROD cleanup levels, will not allow unlimited use and unrestricted exposure. Examples of sites whose remedy includes: pump and treat systems, bioremediation, soil vapor extraction, would require a policy review. USEPA may discontinue policy five-year reviews when no hazardous substances pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. Reviews should be discontinued only when a five-year review documents that the contaminants of concern are reported at levels that would allow unlimited use and unrestricted exposure based on the appropriate period of monitoring. This determination should reflect that ARARs promulgated or modified after ROD signature result in a determination that the remedy is protective.

Upon the determination that five-year review is no longer necessary, a cover letter from the Regional Administrator, or his delegatee, to USEPA Headquarters should accompany the five-year review, stating that the Region has decided to discontinue reviewing the Site. The five-year review report should document that contaminants of concern are below appropriate levels and that the remedy meets ARARs. All subsequent statutory and policy reviews are due five (5) years after the completion date of the previous review.

The successful completion of the final Selected Remedy at the NSA Site will not allow unrestricted access to all areas of the Site after the Selected Remedy is implemented, but a long-term ground water pump and treat activity will be continuing for more than five (5) years after the remedial action construction is complete. Therefore, policy reviews will be conducted every five (5) years after the remedial action construction is complete.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes in the Selected Remedy resulting from the Proposed Remedy being subject to public scrutiny during the Public Comment Period. However, an investigation of the Spent Potliner Accumulation Building (SPAB), and the cleaning of the bottoms of lengths of the Drainage Ditch and the Muddy Gut Tributary near the Refractory Brick Disposal Areas were added after the Commonwealth commented on the draft ROD. The possible contamination of the SPAB floor slab, the underlying soils, and ground water was a lingering RCRA issue which the Commonwealth and the PRP wanted addressed in the Selected Remedy. The SPAB investigation is to be an addition to the Site-wide ground water focus, which should bring the SPAB into compliance with 401 KAR 34:070. The results of the Risk Assessment (a part of the NSA Remedial Investigation) remain the same as do most of the ARARs found in the Feasibility Study. Some State ARARs and/or TBCs were added after USEPA considered the State's comments on the draft Final ROD.

PART 3: THE RESPONSIVENESS SUMMARY

The Responsiveness Summary is required by Superfund law and regulations to provide a summary of citizen comments and concerns about the Site, as raised during the Public Comment Period, and a description of the responses to those concerns (CERCLA §117 and NCP §§300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B)). All comments summarized in this document have been considered in the development and implementation of the Final Action at the NSA Site. The Responsiveness Summary is divided into two sections: 1) Stakeholder Issues and Lead Agency Responses; 2) Technical and Legal Issues and Lead Agency Responses. This division is according to *Superfund Responsiveness Summaries (Superfund Management Review: Recommendation Number 43E)* (OSWER 9230.0-06, June 1990).

Stakeholder Issues and Lead Agency Responses

There were no written comments submitted during the Public Comment Period, which was from July 28, 1999 to August 28, 1999. The comments addressed in this Responsiveness Summary are distilled from the transcript of the Proposed Plan Public Meeting, which occurred on the first day of the Public Comment Period, and from discussions with USEPA Region IV personnel and KNREPC personnel.

Comment # 1 :

The community does not want any kind of incineration or on-site thermal treatment of soils, because there are more than two schools and a population of about 9,000 within a radius of three or four miles from the Site. We understand that the thermal treatment units treating PCBs do emit some dioxins and furans from the stack and that these contaminants can migrate via the air pathway to downwind locations which, in this case, may be Hawesville, Tell City, Cannelton, and communities east of the Site.

USEPA Response :

The analyses and evaluation of alternatives eliminated the on-site thermal treatment option due to inherent problems associated with implementability, cost, and other criteria. The community's unwillingness to accept on-site thermal treatment indicates that that option would not pass the Community Acceptance criterion test.

Comment # 2:

In your presentation during the Proposed Plan public meeting, you said that once the Selected Remedy is completed the Federal government will revisit the Site every five (5) years to see if the remedy is working all right. How long will the Federal government revisit the Site and what will it do if the remedy does not seem to be working as advertised ?

USEPA Response:

Under the current Superfund Law, CERCLA/SARA (the Comprehensive Environmental Response Compensation and Liability Act and the Superfund Amendments and Reauthorization Act), the USEPA is required to revisit completed remedies every five (5) years. If the remedy is not working as expected, then the USEPA is required to respond by doing further investigation and, if the problems are significant, will bring the PRP(s) (potentially responsible party) in for additional negotiations and cleanup work. However, the Superfund Law is being amended by the U.S. Congress and the five-year review provisions may be changed.

Comment # 3:

You said that under the existing Remedial Design Remedial Action (RD/RA) Consent Decree, NSA is submitting monthly reports summarizing the sampling and analyses of the ground water coming from the extraction wells, and also the analyses of the discharge effluent from the Ground Water Treatment System under the KPDES (Kentucky Pollutant Discharge Elimination System) permit. Who does those analyses and how do we know that those analyses are correct? What happens if NSA submits false or inaccurate analyses?

USEPA Response:

Samples of the ground water from the Ground Water Treatment System extraction wells in both the northern and southern portions of the Site, as well as samples at the discharge of the System, are taken on a regular basis, and results of the analyses of all samples are reported on a monthly basis according to provisions in the existing RD/RA Consent Decree and the accompanying Statement of Work (SOW). Therefore, we know what concentrations of contaminants are going into the Treatment Plant and we know what is coming out of the Treatment Plant and going into the Ohio River. The analyses of chemicals in the Ground Water and in the Treatment Plant effluent are conducted partially by the NSA on-site lab and partly by an NSA contract laboratory, the use of which has been approved by USEPA. The on-site lab is capable of producing accurate results for certain contaminants and the off-site contract lab is capable of accurate analyses for other contaminants. Additionally, sometimes both labs will do the same analyses and compare results for validation purposes. Under the provisions of the existing Consent

Decree, the USEPA and the State can, at any time, split samples with the PRP, NSA, and do parallel analyses to check NSA's lab results. There are significant penalties for NSA submitting false or inaccurate lab results to USEPA and the State.

Comment # 4:

According to your Proposed Plan presentation, the last two (2) of the nine (9) criteria for determining the proposed remedy are *Community Acceptance* and State Acceptance. Who decides under *Community and State Acceptance* what is acceptable and how do they do it ?

USEPA Response:

By means of their comments during the Proposed Plan public meeting and in their written comments submitted during the Public Comment Period, the community makes known to USEPA the nature and character of their acceptance or nonacceptance of the Proposed Plan. The community's (i.e., the individual members of the community as well as community groups) comments are addressed in the Responsiveness Summary section of the Record of Decision; the transcript of the Proposed Plan public meeting becomes a part of the Record of Decision package. The State informs USEPA of its concerns throughout the remedy selection process. The State then formalizes its acceptance or nonacceptance decision in a letter to the USEPA; the State's letter becomes a part of the Record of Decision package.

Technical and Legal Issues and Lead Agency Responses

Comment # 5:

Recently, the NSA facility has been the subject of a strike by the United Steel Workers, and now it is up for sale. If another company buys the facility, who will be conducting the cleanup described in the Proposed Plan ?

USEPA Response:

National Southwire Aluminum, i.e., Southwire Company of Carrollton, Georgia, is the only potentially responsible party (PRP) at the moment. If another company purchases the facility with full knowledge of the Superfund problems at the Site, then both Southwire and the purchasor of the plant are PRPs and share Superfund potential liability, including the cleanup envisioned in the Proposed Plan and long-term operation and maintenance of the Ground Water Treatment System and the capped areas.

Comment # 6:

I noticed that chemical treatment was not an option that was mentioned in the fact sheet. Wouldn't it be feasible to have a contractor come in and treat the soil on-site so that the resulting cleaned soils could be put back in the ground where they came from ?

USEPA Response:

Chemical treatment of PCB-contaminated soils was considered in the Feasibility Study and dismissed, because there is currently no reliable chemical treatment technology. The available technologies continue to be more or less experimental and (generally) require the same soil to be treated more than once in order to achieve accepted cleanup standards, in addition to having rather high unit costs, i.e., high costs per cubic yard or per ton of soil.

Comment # 7:

The Taylors Wash Landfill is very close to the Ohio River. Is it wise to place more contaminated material into the Landfill given that when the River is at a high level the old and new contaminated materials will be in the saturated zone, i.e., below the water table ? The Ohio River is already contaminated. Won't placing more PCB-contaminated material into the Landfill cause PCB levels in the River system to increase ?

USEPA Response:

For the majority of the year the River's water level is relatively low and most of the contaminated materials in the Taylors Wash Landfill are not below the water table i.e., not immersed in ground water. There is a standpipe/downpipe or sump through the Landfill at the downgradient end of the Landfill near the clay barrier, or subsurface dam, which is between the Landfill material and the River. Leachate from the Landfill has been sampled by means of this standpipe. The proposed RCRA-type cap and cover system will prevent rainfall from infiltrating into the Landfill during times when the River is low or high. The proposed leachate extraction system, which will draw leachate from the lowest point at the bottom of the Landfill near the clay barrier, will remove and treat Landfill leachate by pumping it from the standpipe/sump to the existing Ground Water Treatment Plant for mixing with other extracted ground waters. The submersible pump in the Landfill will shut off when the leachate level is low (i.e., low River level) and will also shut off when the leachate level is too high (i.e., high River level). For most of the year the leachate level in the Landfill will be low or only moderate. Therefore, the contaminants which have migrated into the leachate from the Landfill material will, for most of the year, end up being treated in the Ground Water Treatment Plant. The small amount of PCB-contaminated soils placed on the top of the Landfill are expected to remain relatively stable; only *de minimus* levels of PCBs are expected to appear in the leachate, and negligible levels in, the River.

Comment # 8:

The danger of a significant earthquake in the Ohio River valley has the potential to impact the ground water and contaminants disposed on-site. Has this possibility been taken into account in the analyses and evaluations which support the Selected Remedy ?

USEPA Response:

If history is any indication, every few years there may be an earth tremor on the order of 4.0 to 4.5 on the Richter scale near the Site. An earth tremor of that magnitude is not expected to displace contaminants and not expected to change surface water and ground water flow patterns. Historically, earth tremors on the order of 5.0 and higher are rare near the Site. An earthquake of significant magnitude (i.e., 6.0 or higher) would produce damages to residences, businesses, and infrastructure (i.e., roads, telephone systems, electric utilities, water, sewer, and gas lines, etc.) which would be of more immediate cause for concern than the contamination at the Site. Exactly what could be done to eliminate the potential problems associated with Site contamination migration caused by a major seismic event remains debatable.

Comment # 9:

I live in Tell City, Indiana, across the River from the Site. Our public water supply comes from ground water wells near the River. Does the ground water contamination (i.e., cyanide, fluoride, metals, and PCBs) under the Site across the River from us affect our public water supply ? Is the water treatment plant on our side of the River sampling and analyzing for the major contaminants found at the Site ?

USEPA Response:

Within the ground water aquifer under the Site, there are two (2) plumes of low-level cyanide and metals contamination. The northernmost plume is associated with the four (4) air pollution control dust slurry and potliner disposal ponds; three (3) are capped and closed and only one is active. There is a smaller plume in the southern part of the Site. Both plumes remain within the boundaries of the NSA property and neither plume has reached the River, according to recent sampling and analyses of ground water from monitoring wells. Generally, it can be said that Site contaminants do not migrate under the River through the ground water to the northern side of the River, because the flow of the River sweeps surface waters and ground waters downriver, and because the hydrogeology under the River is not conducive to lateral subsurface flow. The Cannelton and Tell City, Indiana, public water supply is not immediately threatened by ground water contamination from the Site. However, it can be said that ground water from wells drilled into, the floodplain of the Ohio River may be threatened by general River contamination. Wells into the floodplain aquifer on the northern side of the River may be affected by contamination from very localized sources immediately next to the wells and from upriver sources. The Cannelton and Tell City water treatment plant has been notified by Southwire/NSA personnel of the ground water problems across the River. When their budget and other resources permit, they, in all likelihood, are testing for a wide range of contaminants. The tap water available to Cannelton and Tell City residents is safe to use for household purposes; bottled water is available commercially, if you wish to take further precautions in that regard.

Comment# 10:

In the Proposed Plan public meeting you said that there were four (4) out of forty-five (45) exposure pathways that the risk assessment concluded were of concern. Which exposure pathways were those and how might they affect the regular plant workers on-site ?

USEPA Response:

The four (4) exposure pathways which became of concern as a result of the Risk Assessment process are described in Section 4.1, AREAS OF CONCERN, REMEDIAL GOALS AND OBJECTIVES, page 4-1, of the Feasibility Study, and are as follows. Three (3) pathways/areas were noted as being associated with incremental human carcinogenic risks greater than 1×10^{-6}:

1) Maintenance Workers in the Main Processing Area exposed to PCBS and PAH compounds in subsurface soils. These contaminants occur in the Green Carbon PCB Spill Area (PCBs) and Drum Storage Area (PAHs)

2) Adolescent Visitors to the External Plant Area, exposed to PAH compounds in soil. PAH compounds were reported during the Remedial Investigation in soil samples from an area where solid, wastes were staged prior to off-site disposal, immediately adjacent to the PCB Soil Stockpile Area.

3) Adolescent and Adult Visitors to the Refractory Brick Areas, exposed to PAH compounds in soil from the Historic Refractory Brick Area.

One additional pathway was associated with a high Hazard Index for noncarcinogenic risks:

4) Fauna inhabiting the Refractory Brick Areas, exposed to PAH compounds and inorganic constituents in soil.

Comment # 11:

Are not the private wells and the crops near the NSA facility been sampled ? In the past some of the wells and crops have shown high levels of fluoride and metals according to the information in the Administrative Record Repository at the Hancock County Public Library.

USEPA Response:

During the early part of the Remedial Investigation, samples of residential wells and samples of crops were taken and analyzed. Residential wells upgradient of the NSA facility did not show significant problems, but, as a precaution, residents were urged not to use the well water for drinking. Public drinking water system connections are available for the residents near the Site. Some elevated levels of fluorides were found in a few plants grown near the NSA facility. Since then NSA has upgraded their air pollution control system to better control their air emissions. The nature and character of the natural ground water in the flood plain requires that the ground water be treated before being used for drinking; the naturally-occurring minerals impart unacceptable cloudiness and taste problems to the water. If there continues to be concern about the residential well water and crops, the State can be contacted to take samples for analyses, according to the KDEP project manager in Frankfort, Kentucky.

During the 1970's, the production wells at the NSA facility were also used to supply potable water to the plant workers until problems occurred. Then the facility connected to the public water supply system for its potable water, although the production wells were used for facility production processes.

Comment # 12:

According to the Proposed Plan Fact Sheet, the ecological risk s are at a minimum. However, according to the Federal government, the Ohio River is one of the worst contaminated rivers in the United States. Shouldn’t more be done to take care of the ecology of the River system ?

USEPA Response:

The focus of the Proposed Plan and the Record of Decision is to address the major Superfund problems at the Site, that is, the eight (8) focus areas, which are all in the River’s flood plain. According to the Risk Assessment, the only noncarcinogenic risk of potential concern was ecological and associated with one pathway, that of small animals being exposed to low levels of polyaromatic hydrocarbons (PAHs, for example, benzo (a) pyrene) in the Refractory Brick Disposal Areas. The Superfund Law, the National Oil and Hazardous Substances Pollution Contingency Plan, and USEPA guidance and policy, as well as directives from the U.S. Congress, require that the

USEPA Superfund program address the main risks at each site, that is, the highest risks as determined by the approved risk assessment, and to balance the costs of the remcdiation against the benefits achieved.

Comment # 13:

When the actual construction of the remedy begins, will there be government representatives on the Site to check up on Southwire's contractors and to make sure they are doing a good job ?

USEPA Response:

USEPA will send both its own personnel as well as contract with one of its Regional contractors to provide oversight of Southwire's conduct of the Selected Remedy according to an approved Remedial Design. Federal USEPA and State KDEP personnel will be on-site as much as their resources permit.

APPENDICES

APPENDIX A : RECORD OF PUBLIC MEETING **S** 07/28/99

COPY

PROPOSED PLAN PUBLIC MEETING

SUPERFUND FINAL RECORD OF DECISION

NATIONAL SOUTHWIRE ALUMINUM NPL SITE

HAWESVILLE, HANCOCK COUNTY, KENTUCKY

7:00 P.M., WEDNESDAY, JULY 28, 1999

LEWISPORT COMMUNITY CENTER

LEWISPORT, KENTUCKY

STATE OF KENTUCKY

COUNTY OF HOPKINS

I, Victoria Weisman, a Notary Public, within and for the State at Large, do hereby certify that foregoing is a true and accurate transcript of the proceedings as taken by in shorthand writing at the time and place aforementioned.

Witness my signature this 1st day of September 1999.

Notary Public - State at Large

My commission expires May 14, 2000.

MS. GIBSON: We'll get started now although I know it's nice to be in the air conditioning. My name is Cindy Gibson. I'm Community Involvement Coordinator with Region 4 out of Atlanta, and I'm glad to see you all here tonight. I know it's tough to get out in that heat, again, but at least it's air conditioned in here. Tonight we're going to have a Proposed Plan Meeting for the National Southwire Aluminum Superfund Site in Hawesville. Tony DeAngelo is the project manager and he'll give a brief overview of the site and the proposed remedy and this will start, tonight starts the beginning of a thirty-day, it's actually a couple more days more than thirty-day comment period for you all and we've got envelopes over here. You can take one with you. It's got postage on it and everything. Send your comments into us. During that thirty-day period we'll take any kind of written comments. You can call us on the phone and let us know what you think of the proposed plan, and then once the comment period ends, it's thirty days. You can, if you feel it's necessary, request a thirty-day extension of that comment period and it would be granted. Then Tony DeAngelo would write a responsiveness summary to answer any of those questions and then based on the public's input and the best science available to us, then we'll make a final decision on the remedy. So, I want to make sure before you all leave that you did sign in. I think you all did. I keep the mailing list current so that any subsequent fact sheets that we send out or any notices about meetings, you'll be sure and get and if you didn't get a copy of tonight's overheads, we ran out of those, and if you would like a copy when the meeting's over, just let me know and I'll be sure and send you a copy of those. Also, when Tony's done, we'll just have him go ahead and go through his presentation and then we'll open it up to questions and answers. We're required by law to have a court reporter here. That way any of the comments made here tonight become a part of that public comment period, but if you do have a question or a comment, if you would stand and say your name and if it's an unusual spelling, spell it so the court reporter can get it correct in the transcript and then we'll go from there. Okay? Any questions? Okay, well, I'll turn it over to Mr. DeAngelo then.

MR. DeANGELO: Thanks. Basically, this public meeting is required by the Superfund Law. It's to give the public a general idea of the remedy that we're proposing with the NSA Superfund site and to solicit any comments, simply stated. The presentation I have is kind of dry and somewhat bureaucratic. I'm an engineer by training so I tend to dwell on the more dry things, but I'll try to keep it straightforward and to the point. If I get in the way, tell me.

The purpose of the meeting, there's no other propose of the meeting other than to give you an idea of what's going. First, I'll start by talking about the basic Superfund process, just to give you a general idea. There are tens of thousands of these sites across the country and so what we do is try to identify them and to rank them and rate them and the ones that according to our system of ranking are the most severely contaminated or present the most public health or risk or the most ecological risk, those are proposed or they're further investigated then they may be proposed to the big list which is the National Priorities List, and then once they get on that list they're subject to further investigation and study. A Remedial Investigation is done. The average cost of one of these is three-quarters of a million dollars to a million dollars, and teams of engineers and scientists go out and take samples and then analyze the samples and bring them back and put this all together in a package and then they do a Feasibility Study and they take what was in the Remedial Investigation, all that data, and they look at the areas that need to be taken care of and then examine the options for cleanup in those areas, and then usually they recommend that something be done according to their analyses. And then what we're trying to do now is do a Record of Decision, and Record of Decision is EPA's formal decision as to what the remedy of the site should be and that takes into consideration your comments and the State's, we have three State people here, and actually it has to be signed off on by the State before it's accepted by EPA. That's the way they're working it now anyway.

Okay, once the Decision Document is done, we go through a process whereby, in this case, the lawyers get together, the lawyers for what we call the Potentially Responsible Party or PRP which is National Southwire Aluminum. These lawyers get together with our lawyers at EPA and the lawyers in the Department of Justice, U.S. Department of Justice, and they negotiate a U. S. District Court consent decree and then once that's final then we can proceed to the phase where we actually design the remedy. We do the blueprints and then we begin construction using those blueprints. Hopefully at some point, we get around to actually cleaning up the site when this construction is completed or when, say long-term groundwater pumping operation is done, and at that point every five years after that, we go back and we look and see if the remedy's being effective.

In the case of NSA, we have what we call the Lead Agency, the Support Agency and the PRP identified. The Lead Agency: in this case it's the federal government or the United States Environmental Protection Agency; the Support Agency is the Commonwealth of Kentucky, specifically the KDEP and of course, as I said, the PRP is National Southwire Aluminum (Southwire Company).

So over a period of years, the last few years, it may seem like there's not been a lot being done, but there actually has been quite a bit done and you can follow the progress of what's being done at the site by looking at the enforcement activities, the regulatory activities. The first one started way back in the early 1990s; it came about through an Administrative Order on Consent with the United States Environmental Protection Agency and NSA where we started a long-term Remedial Investigation and Feasibility Study that's gone on for actually six and a half years or so; and there are reasons why that is.

The second phase was done in 594 and 595 and that was a fast-tracked ground water remediation. We had an initiative under EPA called SACM, which stands for Superfund Accelerated Cleanup Model, and I guess I could go into some detail, but that would probably bore you, but it’s rather interesting how it works, how it worked. Anyway, what resulted was what we call an Interim ROD or kind of like a mini ROD and what followed was a consent decree to implement it in U.S. District Court; what that did essentially was make Southwire go ahead and build a ground water pump and treat system. I believe the actual plant cost over a million dollars; there are numerous wells around the site that NSA pumps from, and the reason they did that was because they had elevated levels of cyanide and fluoride and metals in the ground water. Actually there are two major plumes. The largest one is in the northern part of the property and the smaller one is in the southern part of the property; the plant is still operating and actually cleans the ground water quite well; it discharges through what we call a KPDES permit to the Ohio River; NSA takes samples probably weekly, but EPA gets monthly reports on what goes in and out of that plant.

And the third phase or the third enforcement action was what we call a non-time critical removal. What we found was that out of the four impoundments or ponds out there, a couple of them had been closed out, they had a third one that had not been closed out and had air pollution control slurry in it, but there was a problem in that the disposed potliners from the main plant, which contain cyanide, had affected the ground water in that area; so that pond was being dewatered as they say. In other words, they tried to compress the wet slurry down and then they put a cap over the top of it to keep rainfall from going down in there and creating even more of a problem. Once again, that was the third enforcement activity.

The main contaminants at the site in some of the soils and sediments are PolyChlorinated Biphenyls or PCBs. There were also some creosotic compounds, Benzo(a)anthracene, benzo(a)pyrene. In creosote there are about two hundred compounds and there are perhaps six or seven possibly carcinogenic or probably carcinogenic compounds of those two hundred that we know of at this point, and also metals in the soils. In the ground water, of course, it’s cyanide and elevated levels of fluoride and metals.

As a part of the Remedial Investigation process we do a Risk Assessment, and there are actually people who make a very good living at calculating the risks in these situations and they have, what they call, standard exposure models. In other words, for a specific person doing specific tasks in a given area, they assume certain exposures. In other words if somebody is in a refractory brick disposal area and they’re digging in the dirt there and they do this every day, you know, for so many weeks, five days a week for so many weeks, then you can get some idea of what type of exposure they have; or if they drink so much ground water or have skin exposure to ground water you can use certain standard numbers to come up with, what we call, excess lifetime risk; and what this means is out of the general population there’s a base of twenty-five to thirty percent of people who will get cancer or be affected by cancer. It doesn't mean they're going to die. It just means they'll have a cancerous tumor. Everybody in this room has micro tumors in their body just like we all have bacteria and fungi and viruses in our body and our body fights it, if the immune system is good. What happens is some of these chemicals, if you're exposed to them in high enough quantities or a lengthy period of time, will affect the growth of these micro tumors and you may begin to have problems; but you may not know you have a problem because you can live with a tumor for a long time and not know you have it.

So what the risk assessors do is to try to calculate this excess lifetime risk, in other words, how much over this twenty-five or thirty percent risk is going to be associated with people in certain situations, exposure situations at the site, and what we try to look at in our conservative models is an additional chance of one in ten thousand to one in one million. That's for the scientific people in here, that's ten to the minus fourth and ten to the minus sixth risk, which is a very slight risk, given the model, so that we err on the side of caution in these situations. The baseline risk assessment in the Remedial Investigation looked at forty-five exposure pathways on the site for general workers, maintenance workers and visitors and four of them came up marginally. I'm starting to lose my voice here. In other words, basically four of them were in the area of one in ten thousand additional risk. And you can go down to the Hawesville library and you can take a look at the risk assessment and it will show you exactly what the calculations produce and so if it comes up that it's less than one -- that's it's a greater chance, say one in one hundred or one in one thousand or if it's in between these two numbers, it will appear in the risk assessment and you can see exactly what type of exposure is produced in a given situation.

They calculate not only the carcinogenic risk in these situations, but also what they call a noncarcinogenic risk. Basically you have what they call hazard quotients which add up to hazard indexes, and then it gets rather complicated even for the people who do it every day.

So in looking at these exposure scenarios, we looked at the different areas on the site where we had these excess risks, and we came up with basically these seven focus areas. Green Carbon PCB Spill Area is near the pitch tanks, if you know about the facility. The Refractory Brick Disposal Area is in the northwest part of the facility. It has low levels of PCBs or did the last time we sampled it. Taylors Wash Area is basically a landfill. It has a sump or a downpipe in it and there is leachate at the bottom of the landfill. There's a little tiny area in the Drum Storage Area which is more towards the river and the southeastern portion of the site. There is a PCB Soil Stockpile Area which is more toward the northern part of the main facility and that has basically just slight surface contamination, and for Areas Number 6 and 7, basically we're talking about things that have already been done. As I mentioned the site-wide ground water situation, we already have the plant operating and it's already pulling ground water up and discharging it; and 7, the old South Slurry Pond, that's been capped and the cap is being maintained and the wells around it are being monitored.

This overhead will give you an idea of where the, some knowledge of the layout of the site. Right down around here (indicating), pitch tanks, Refractory Brick Disposal Area, these areas here (indicating), Taylors Wash (indicating), Drum Storage Area here (indicating), and this is a light surface contamination of PCB, PCB Soil Stockpile Area and the South Slurry Pond, that's closed. Ground Water Treatment Plant is right down in this area (indicating). I have another graphic that will show you basically where the lines go.

First, as I said, we do a Risk Assessment within the Remedial Investigation and then we do a Feasibility Study examining the alternatives for cleanup and at that point what we're doing in the decision document when we're trying to come up with the preferred or selected remedy, is to go through nine criteria. EPA has a rather extensive guidance on this exactly how each cleanup alternative either satisfies or does not satisfy the criteria, and the first two criteria are pretty straightforward. They're called "threshold" because you filter out the alternatives pretty quick with these two. Overall protection of Human Health and the Environment and Compliance with Law and Regulations. Probably these are equally important. What comes into play after a while is the importance of satisfying all the laws and regulations that apply to the situation.

The next five criteria are what we call Primary Balancing Criteria. We look at the Long-Term Effectiveness. If we do actually complete this remedy, this alternative, is it going to be effective in the long-term? Is it going to reduce the toxicity of the material, is it going to reduce the ability to travel, or the mobility, or is it going to reduce the volume of material to a smaller volume? And then what is the short-term effect, is this going to take years to happen or is it going to be done in a matter of months? Can you actually implement it on the site? This implementation came into play up in Cincinnati. There was a small site. It was a couple acres and had businesses and industry all the way around it. They had to bring in a thermal treatment unit eventually on a cable; they had to hoist things up onto the situation, or onto the land there utilizing a Rube Goldberg type setup because they couldn't get down the narrow road to the site, so they couldn't implement the remedy without a whole lot of trouble. They still did it, but it was difficult. And the 7th thing is cost. Cost makes a lot of difference to the people who are paying for it. You know, what are you getting for your money? Right now in Congress, Republicans want to subject all federal regulation to cost benefit analysis. This, we're already doing in this type of situation. We're saying: what are we going to get for our money? Is it going to work in the long term, how long is it going to take, can we actually do it?

And the last two criteria which are probably the most important, does the state accept the remedy that we've selected, I'll talk about that a little bit in a moment, and does the community, finally, does the community accept this, the community, the people who live near the area, do they think that it's the right thing to do, and that's why we solicit your comments and answer all of them. Then we compile them and place them in the last section of the decision document. And when that document's is signed off on by EPA higher management, then we say that we considered your comments and this is why or why not these things, your suggestions, could be implemented or not implemented.

And for this situation, this site, this is a table. Basically, it's a composite of what's in the Feasibility Study. You can see over here (indicating), it says 5C, it's actually 5A and 5B and that's Alternative Number 5. Alternative 4 you can see passes all the tests except for the last two. We haven't really come to it yet, but EPA has suggested that or recommended a variant of these two in the Proposed Plan because Alternative 5 does not address some of the

State’s concerns about the PCB contamination and the Green Carbon Area. I think a lot of these, all three of Number 6 variants, they kind of fell out because they were excessively costly, somewhere in excess of a hundred million dollars. You’re starting to get up around or over where the value of the actual plant itself is and you’re talking essentially about, at that point, how clean can you make the plant, the plant area. You can’t get it squeaky clean, so what is the compromise, how do you balance all these factors? How do you keep the people in the plant working? How do you keep the plant working without bankrupting it or causing severe financial damage to the company that owns the plant?

These are some of the costs that came out of the Feasibility Study. All the costs, these capital costs, include what money has already been spent on the closure of the slurry pond and the construction of the ground water treatment, extraction and treatment plant system. These numbers will probably change in the decision document. I’m having somebody go over these numbers and generate new numbers They'll probably be slightly lower.

It will be just a short while to the end, if you'll bear with me. Once again, here's another idea of what's going on in the areas that we're addressing and this comes from the Feasibility Study and the little boxes show basically what type of remedy we're looking at in each of the areas.

For the Green Carbon Area, in the proposed remedy, we're looking at deed restrictions, hotspot removal, possibly rerouting underground utilities and a cap, if necessary. The State has suggested or recommended that we go no further down than about four feet from the surface. We're looking at how we define the surface soils as zero to two feet down and then subsurface in this case is defined as two to four, and we have certain numbers in terms of total PCB concentrations that we're looking at. Probably for the surface soils down to two feet, it's one hundred parts per million total PCBs and for below that it is a thousand parts per million. And for this area also, we would, basically people who would be in that area would be advised or told that, you know, what's there and what problems had been associated with that particular area. Now, what we're talking about in terms of digging up this material and taking it someplace. We're looking at the lower concentrations going on top of the Taylors Wash Landfill and then capping that. And then for the heavier concentrations, we're talking about hauling them off to a secure hazardous waste facility. That's the proposal at the present time.

This will give you some idea of the areas that we're talking about. These are the pitch tanks (indicating) and all this contamination, varying to one degree or another underneath all this paved area. I believe most of it is paved, and then some places at greater than ten feet deep we have well over a thousand parts per million total PCBs.

We're also looking at the Refractory Brick Disposal Area, putting deed restrictions. on it, a semi-permeable cap because it's a low, wet area and then fencing around it with, presumably, signs on the fences. And the

Taylor Wash Area, we're talking about deed restrictions and a cap. We call it a RCRA Subtitle D cap, which is a multi-layer cap which, presumably, is impermeable and keeps rainfall from infiltrating into the Landfill. Then we're talking about taking the leachate from the bottom of the landfill and pumping it through a force main to the ground water treatment plant and treating that leachate through the plant. Essentially it would be diluted with all the other ground water that's going into the plant. We can put a valve on there to vary the addition.

Once again, here's a graphic of the Refractory Brick Disposal Areas. It's a considerable amount of acreage.

Here's a graphic, of the Taylors Wash Area. There's no structures on any of these areas that I'm showing you, 2 and 3. Then there's a tiny area of contamination, the Drum Storage Area. Basically, we plan to excavate it. It's a rather low level contamination. We can put it under the Taylors Wash Area RCRA cap. Then there's another area, PCB Soil Stockpile Area, that I identified and you can excavate the hot spots or actually you can just scrape the whole top of that area and put it under the Taylors Wash cap.

And then what's already being done is site-wide ground water treatment, put deed restrictions on essentially the whole plant and then you just continue pumping and treating and you monitor the ground water. The numerous wells around this site are monitored on a regular basis. Same thing with the Slurry Pond: maintain the cap, impose deed restrictions and monitor the ground water.

That's pretty much it for my rather dry presentation. The public comment period starts is today goes to August 28th. If you want, you can extend it thirty days beyond that, but we have to have a written formal request for that. I would like to open it up for any questions that you have and try to answer them.

MS. GIBSON: And I'll remind you too, there were some people that came in late, that we do have a court reporter and if you do have a question, to stand up and state your name, spell it if you think it's necessary and then go ahead and ask your question or state your comment and one thing I failed to mention was that there is an information repository at the Hancock County Library and all the reports relating to this site are available. They do have a copier or you can request your own copies of these reports from our Freedom of Information Act office and that address is listed in the fact sheet. And for your comments, if you want to, you can pick up, we've got the postage-paid envelopes here addressed to us, pick one of these up on your way out and you can send your comments to us. Okay.

MR. ROE: My name is James Roe and my question is: has there been any testing of the ground water, you know, like three or four miles away from the plant facility? Any cyanide in that?

MR. DeANGELO: Not in recent times, not by, I don't think Dames and Moore has done it. I know the EPA hasn't done it in recent times. Usually wells can be tested or sampled and in the interim sampled and tested by a county extension service and any water that's pumped and treated by a public municipality is also tested on a regular basis. Your question points to another question and that is: is the contamination at the site affecting the municipal water supplies three or four miles away. I think the answer probably is "no" as far as I know. I think it's pretty much localized. As I said, the north plume is rather substantial and there is a smaller plume in the southern portion of the site.

MR. ROE: If I want to get my well water tested, I can just take it to the extension service?

MR. DeANGELO: They should be able to do it for you, depends upon what contaminants you're testing for. If you're testing --

MR. ROE: The main thing, I want to see if it's got that cyanide in it.

MR. DeANGELO: Yeah, I think they could probably do that relatively easily, depends upon, there's two different, there's two variants of cyanide, or two ways of, major ways of looking at the cyanide concentration, and so they, the easier one, I think, to do is the less expensive and I think they would probably do for you but I can't speak for them.

MR.ROE: Thank you.

MR. BEAVER: My name is John Beaver, B-E-A-V-E-R. I'm with the Local 9423. I'm one of the Health and Safety Committee members. According to our research and fact sheet, NSA Southwire found PCBs in soil levels at almost nine thousand parts per million while excavating for a cooling tank in '92. Southwire's excuse was that they came from spills in 1970. My first question would be why wasn't the employees notified at the time and why did we wait until '92 to present this to the public, but furthermore, why did we violate the law twice when we first discovered it by moving it from one area instead of taking care of it right the first time, and would this maybe explain why there's commonly -- the Kentucky Wildlife won't let us eat fish out of the Ohio River because of the high PCB levels. The point I'm trying to make here, if the company doesn't tell its workers or the community at the time that it happened of such a significant accident how can we be comfortable with this disclosure plan that Southwire is now presenting to us. We worry that there may be many more skeletons in the NSA closet and they're trying to wash their hands of their environmental liability. We don't want environmental nightmares like we've heard of in the past. Can we be offered by Southwire or by the EPA any assurance that we will not discover other significant contamination on the site? Furthermore, can Southwire assure us that their remediation has considered all options and will be maintained to the best of today's technology? In other words, is Dames and Moore, are they considering every option out there?

MR. DeANGELO: I can't speak for Southwire with regard to the cooling tower soils. I know that numerous truckloads of heavily contaminated soils were taken to a secure hazardous waste facility quite a few years ago. The last part of what you said, I think, points to something you said before the meeting and that is why haven't we considered thermal treatment or chemical treatment of PCBs.

MR. BEAVER: Well, the way I've been informed, we definitely don't want thermal because what do we have within a three mile radius of Southwire - two, three schools, at least three schools, maybe a population of 9,000, so we're emitting all this stuff, we're taking it from the ground and putting it in the air. I think that would be a worse problem.

MR. DeANGELO: You wouldn't be putting PCBs into the air. Most all of the PCBs would either be dechlorinated, the chlorine atoms would be taken off the molecule or they would end up in activated carbon (inaudible) or in other kinds of, in other parts of the air handling system. I worked on one of those thermal absorption units which treated PCBs for several years.

MR. BEAVER: Yeah, but wouldn't there be a large amount of dioxins released in the process.

MR. DeANGELO: The stack is tested continually and there may be minor amounts of dioxin, parts per quadrillion, but at that point you're getting, you know -- dioxin at that level is pretty ubiquitous virtually anywhere, parts, you know -- there was a recent study done by Cedar Sinai and what their finding is PCBs and DDE which is the -- which can come from DDT, and other contaminants are appearing in parts per quadrillion in amniotic fluid in pregnant women, so it's pretty much ubiquitous, so once again, you have to come to the situation where you’re saying how clean is clean and how much is going to do damage. Remember I said we’ve got these pre-cancerous cells and micro tumors, so how much of this contaminant is going to cause these micro tumors to grow. I can’t answer that question. I’m not a toxicologist and I understand the concern but there are these type of risks from contaminants in everyday life. Now whether you’re tuning up your truck in your driveway and the exhaust is around you or whether you’re out in your garden in the backyard and you’re using some kind of pesticide dust on tomato plants, so the question is, I don’t mean to get away from it, but how do you balance or how do you judge these risks, so if you do have a thermal absorption unit, which is not going to happen in this case, I don’t think, is it really going to do what you believe it’s going to do, what you indicated, and I don’t think that’s going to happen. As far as not looking at thermal desorption, that was looked at and for the reason you specified and other reasons it was eliminated from consideration after a certain point. I’m talking about setup costs, mobilization costs, if you want to look at the money part, of probably a half a million bucks just to move the machine out there. The one that I was on was fifty-two tons, the machinery, and they burn like six million cubic feet of natural gas to fire it up just for a short period of time and I could go on and on. It’s like three hundred and fifty dollars a ton to do that, and then you have to treat the soil twice sometimes.

MR. BEAVER: Well, I noticed that one wasn’t even on there that was an option, that wasn’t even mentioned in the fact sheet and that was chemical treatment. Why wouldn’t it be feasible to have a company come in and treat the soil that’s there instead of capping it or digging it up and moving it somewhere else and making it somebody else’s problem.

MR. DeANGELO: Well, once again, what you’re doing is saying how much bang are you going to get for the buck, how clean is clean. Chemical treatment doesn’t always work the first time. You have to treat it maybe two or three times in order to get the PCBs out of it, to dechlorinate, and that's essentially what they're doing, so I think the whole idea is to go back to the risk assessment and you've got this excess lifetime risk and you're using very conservative exposure scenarios and you're saying is it really worth it to -- if you ran the additional risks as one in a billion or one in a million, is it really worth it to go through all this trouble and why not just reduce the exposure by containing it or removing the hot spots and contain the rest of it. You, know, if you really feel that these other options are not being considered enough, send in your comment. We'll be glad to further consider it.

MR. FRAIZE: My name is Frank Fraize, F-R-A-I-Z-E. There's a couple of things I've been looking here on your -- this Taylors Wash out here, how close is that to the river?

MR.DeANGELO: Very close.

MR. FRAIZE: Do you think it's wise to put this that close to the river, the contamination?

MR. DeANGELO: Well, most are of the contaminants are not in the saturated zone as far as I know.

MR. FRAIZE: We're prone to have earthquakes around here, earth tremors, that and also the aquifer, even though that the water around this area may not be contaminated, it wouldn't take much of a tremor to contaminate it all, is that correct?

MR. DeANGELO: It may be. It would depend upon the situation.

MR. FRAIZE: Well, I mean, if we had a earth tremor where it shook the earth enough to change the aquifer where the water running underneath the plant went a different direction within this three or four, nine mile area, what then? It’s going to contaminate the whole thing, right?

MR. DeANGELO: Well, it would take time for that to happen and then --

MR. FRAIZE: Well, I plan on living a little while.

MR. DeANGELO: Well, the thing is you have monitoring wells all over the place out there that are monitored on a regular basis, so if that should happen and we would start picking up the contaminants in the wells --

MR. FRAIZE: But at that time it's too late, right?

MR. DeANGELO: Well, that would mean that the contaminants are at the wells and all those wells from my understanding is that they're on NSA property

--

MR. FRAIZE: But the aquifer runs under the plant. It doesn't just stay underneath the plant.

MR. DeANGELO: Well, now, the contamination that is in the river and the ground water that's closely associated with the river, that's coming from many sources upstream and --

MR. FRAIZE: I'm not talking about the river itself. I'm talking about the underground water, the aquifer.

MR. DeANGELO: Right. Well, essentially you're talking about the same thing to a certain degree because the water travels laterally from the river to the, what you call, the aquifer and on the side of the river and back. It depends upon the hydraulics of the situation.

MR. FRAIZE: But with an earth tremor it could change.

MR. DeANGELO: With an earth tremor it could change.

MR. FRAIZE: Okay, there's something else I was going to ask about. Back over here around this -- see, you've got your pitch storage tanks here, back over here, you've got a pitch -- has that been tested right in there?

MR. DeANGELO: That's been tested. They tested the water at or near the pot liners storage building --

MR. FRAIZE: This isn't pot liners here. This is, this right in here is --

MR. DeANGELO: I'd have to look back --

MR. FRAIZE: This spur right in here.

MR. DeANGELO: Well, that's right next to the pitch tanks.

MR. FRAIZE: Okay, then one more thing. Oh, about the one in ten thousand chance in developing cancer, it seems like over in Riney where there’s a lot of (inaudible) and a lot of different things, it seems like there's a lot more cancer over there than there is anyplace else. Do you have any idea what would be causing that?

MR. DeANGELO: I don't know. I'm not familiar with the area. In cities and towns there's all sorts of stuff that's in the ground water under them. For instance, if there were drycleaners operating in the area, they may have just dumped the contaminants in the back of the facility and they have a lot of problems with old drycleaner situations. You also have garages and places where people fix automobiles, and that's another source of contamination. You have machine shops, solvents. You have people changing their oil in their driveway and they don't know how much damage they're doing by doing that sometimes.

MS. GIBSON: I would suggest that if you do think there is a problem with cancer, we have representatives with the agency for Toxic Substances and Disease Registry located in our building and I'd be glad to give your name to one of them and have them contact you about health concerns.

MR. FRAIZE: Okay, I'll write my name down.

MS.GIBSON: Here's the 800 number.

MR. FRAIZE: Oh, okay. Thank you.

MR. DeANGELO: What I have been saying is you have to look at all the possible sources of contamination in the area and what's reaching -- are you getting the municipal water supply from wells in the area? You need to look at all the possible contaminants or sources of contamination. I'm familiar with a place called Jackson, Tennessee and they have a, they've got the U.S. Geological Survey in there as well as EPA and other agencies and they're taking a look at all their sources of contamination in the city because they get their water, all their water from ground water. Yes, ma'am?

MS. HOSSLER: My name is Candy Hossler and I live in Tell City, Indiana and this kind of goes along with what he was saying. Here on Page 3 it says, it's talking about the aquifer and it says more than sixteen thousand people obtain water from of these sources. Most of these water consumers live across the Ohio River from the Site. How long would it be before the people in Tell City would know that the water's contaminated, the people that are --

MR. DeANGELO: They would know immediately if the municipal water supply is doing what EPA and the State tell them they're supposed to be doing. They're supposed to be sampling and analyzing the water on a regular basis, not only what goes into the treatment plant but what comes out of the treatment plant and there's certain specific contaminants that they analyze for. If they're smart, what they'll do is do what we call a full-scan and TCL/TAL and basically they look at all the major organic contaminants and then all of the inorganic contaminants. The organic means things like solvents and inorganic means things like metals. There are basically about a hundred and fifty of those contaminants or chemicals that they look for in the ground water and they should be doing that on a regular basis. I don't know what their frequency is on that, and they should, I believe they should also be reporting it to the people who they supply water to on a regular basis.

MS. HOSSLER: So would they just -- so are they on a regular testing for what, PCBs and things like that also or --

MR. DeANGELO: If that appears to be a problem, then they should be doing it.

MR. BEAVER: I've got some more comments. I've seen environmental profiles for NSA Southwire and Hancock County and it ranks NSA at the top twenty percent in many categories for toxic air releases. It would appear to me that it would also be a priority to NSA Southwire and the EPA to effectively decrease all air emissions to prevent future soil contamination. This could be achieved through technological equipment and the use of nontoxic chemicals. This seems to be a problem with NSA because the data shows that all categories of air emissions except for two have increased over the years of 1988 to 1996. Yet the other six industries in Hancock County have found technological ways to minimize their air emissions. Why hasn't that happened at this site?

MR. DeANGELO: I can't speak for Southwire.

MR. BEAVER: Well, what I Im asking is how can we clean something up when we're constantly releasing this stuff which is eventually going to end up back down on the ground and then, then you're not taking into effect, you're not considering the ditch to the west of the plant. I mean, everything washes to that ditch and then spills out to the Ohio River. Why isn't that addressed into the plan?

MR. DeANGELO: Well, I addressed that, I said before in our earlier conversation, put that in your comments and we'll see what we can do.

MR. SHOUSE: My name is Keith Shouse, S-H-O-U-S-E. A couple of questions that kind of tie in together. On the Green Carbon Spill Area you say the lower concentration would be put under the Taylors Wash cap. What is the lower concentration? I mean, ten parts per million, twenty, or I mean less than that or --

MR. DeANGELO: Probably be less than twenty-five would go in there, and I guess the action level would be one hundred parts per million but that would be for soils from zero to two feet down and then you're looking at excavating the higher action levels at depths lower than that. Now, what you have to consider is that all the soil that we take out is not going to be one hundred or whatever the number is. It is going to be a little bit here and a little bit there, so you're actually going to excavate more soil than you would if you could identify exactly how much and where it was. So probably you're talking about double digit parts per million, as the highest concentrations than what you would put under Taylors Wash.

MR. SHOUSE: I understand that there will be a standpipe to collect the leachate and once it's capped and there will be a clay barrier. Will this be pumped continuously. I don't know how deep the Taylor Wash is myself personally. Is it twenty foot, thirty foot, you know, is groundwater seeping in all the time? Would it be -- if it's not pumping all the time, what's going to keep it from migrating?

MR. DeANGELO: Well, as long as you keep a negative pressure on it, what would happen was that it would be that once the water level got to a certain point the pump would switch on and then pump it all the way down to where the pump would cavitate or almost cavitate and then that would, there would be one-way valves presumably so that it wouldn't flow back and that, this would be pumped through a forced main to the ground water treatment plant. So any time the water level came up to a certain point then the pump would switch on and pump down until essentially the pump couldn't pump any more. Now, as to what would happen when the river rises really high, that's another question. You'd have to have certain procedures in place for that. When the river rises, of course, there's a pressure, lateral pressure and water flows into the flood plain toward the plant, so what you're saying then is that when the river goes back down again and the water starts flowing, it tends to flow back to the river then does it take these contaminants with it, and I think the answer probably is yes. But the thing is are the contaminants diluted or are they in concentrated leachate form, so it probably would be diluted to a certain degree. The river really is, tends to be a sewage pipe, it shouldn't be, but ihe Taylors Wash landfill situation is not unlike many other along the river, so once again, you have to take a look at the risks, you know, what kind of risk is associated with that lateral flow and how much in the way of contaminants is going to the river.

MR. SHOUSE: So it would matter where you put your standpipe and how deep?

MR. DeANGALO: Right. If you put the standpipe, I think it's like right next to the clay barrier, when the river is down, then everything is going to collect down at the deep end.

MR. SHOUSE: Is that the deepest end?

MR. DeANGELO: I think that's -- Mr. Sands?

MR. SHOUSE: Is that the deepest end because I would think you would want it at the deepest end?

MR. DeANGELO: Yeah.

MR. SHOUSE: Thank you.

MR. DeANGELO: Yes, sir.

MR. ERWIN: My name is Gary Erwin, E-R-W-I-N. Mr. DeAngelo I have a few questions here. You stated on one of your early overheads that every five years that the government will go back and check the proposed cap site, is that correct, and to inspect the poisoned site. How long a period of time will they keep these five years inspections up? Will this go on forever more? Is there a standard period of time that this will take place?

MR. DeANGELO: Well, until the agency decides that it's no longer a viable way of doing things. For instance, right now Congress is amending the Superfund Law. The five-year review may disappear. Right now it's on the books, so what we're looking at is going back every five years, perhaps doing some sampling on our own, taking a really good look at the construction and how well the ground water treatment plant is operating, have the caps been maintained, take a look at all the data that comes out of the monitoring wells being sampled, that type of thing, and if it doesn't pass muster in that five-year review, then we can also go back in if the law allows us to and tell the owner, the potentially responsible party, to do more or to do more investigation and perhaps do more remediation.

MR. ERWIN: Well, let's say it does pass muster. I mean, are you going to come back in another five years and look again?

MR. DeANGELO: Yes.

MR. ERWIN: So what I'm trying to understand, there isn't really a time limit?

MR. DeANGELO: No. Under the present law there's no time limit.

MR. ERWIN: Who runs the samples that you say you generate a monthly report on the water samples? Who runs those samples that you receive?

MR. DeANGELO: It is a contract lab that is paid by Southwire, actually I believe Dames and Moore arranges for that; that is my understanding. Is that correct, Ken?

UNIDENTIFIED: On the weekly samples that are taken?

MR DeANGELO: Well, whatever they send out with the monthly report.

UNIDENTIFIED: Some of them are done in-house but most of them go to a contract lab.

MR. ERWIN: So some of them are actually done in-house? That's incredible. Okay, you said there were four exposure pathways on the forty-five that were identified that were of major concerns. Can you tell me what those four were?
MR. DeANGELO: Right here in the Risk Assessment. We had a list of them are either associated with adolescent visitors, in other words, teenagers get out there and mess around, adult visitors, adults going out there and messing around, and then they can be associated with all sorts of things like ingestion or chemicals in the surface water like from the ditch, skin contact with chemicals in surface water from the drainage ditch.
MR. ERWIN: You're talking about the west ditch again?
MR. DeANGELO: Presumably, that's it. And you have also situations associated with, and also adolescent and adult visitors, situations associated with the Refractory Brick Disposal Area where you perhaps have actual PCB soil contamination at the surface and then you have dermal contact and perhaps ingestion. I think that’s what the four are.
MR. ERWIN: Thank you, Tony. I have two more questions.

On your overhead you had one there where you talked about state and community acceptance of your plan. Who decides under state and community acceptance just what is acceptable?

MR. DeANGELO: Well, Eric, do you want to say what's acceptable to the state or not?

MR. LIEBENAUER: My name is Eric Liebenauer, L-I-E-B-E-N-A U-E-R. With me are Rick Hogan and Fazi Sherkat, S-H-E-R-K-A-T, Rick is my supervisor; Fazi's my manager. I'm the engineer who does the review for the work done at National Southwire for the state and the short answer is: we in the Division of Waste Management the three of us, decide what's acceptable. However, we do have other parts of government, namely our office of Legal Services within the Natural Resources and Environmental Protection Cabinet, and our Risk Assessment Branch, which is in the Department for Environmental Services and they help us by providing additional review on this site and, collectively, we and our management, if necessary, will all make a decision as to whether or not enough has been done, and I've got a business card if you need it. If you have any questions you can call me.

MR ERWIN: Thank you, Eric.

MR. LIEBENAUER: Anyone else need one? I've got more.

MR. DeANGELO: In terms of what's acceptable to the community, basically through your comments during the comment period, you make your views known. If you say to us this is totally unacceptable or parts of it are unacceptable and you give good reasons for it, then we certainly are going to consider, reconsider, what we're going to do about those particular items that you're concerned with, and "no", we do not ignore you. Nowadays EPA does not, I know it may seem so, but we don't come in with heavy hand. We regard all the people in this room as stakeholders not only just people that are concerned with the facility; so you have some stake in the decision we make. But we don't know what your concerns are unless you tell us and that may require that you sit down with a pencil and paper and some of these documents and say: "I don't understand why you proposed this part of the remedy and not only do I not understand why you didn't look at other ways of doing things, but here is a couple other ways that you might want to, couple other things that you might want to look at"; not to just criticize, but to make suggestions, and that requires involvement, input.

MR. ERWIN: I have one more question and then a final comment. How did you arrive at the dollar amount, I think it was on one of your last overheads, that you listed there for the ground water treatment costs?

MR. DeANGELO: Well, there are two parts to the ground water treatment cost's and that is (1) the plant and building the plant and extraction, drilling the wells, each one of those wells has a pump in it, building the booster station and the lines to the plant and (2) certain capital costs for construction and certain operating and maintenance costs. For instance, at least in one well I know of they had an algae problem and it may be related to a metals situation, so sometimes that well cannot be pumped from and it has to be cleaned out in some way or sometimes a pump will go down and then they have to replace that. That's the general operating and maintenance costs, and those costs are reported to us by National

Southwire.

MR. ERWIN: So it's their numbers, correct?

MR. DeANGELO: That is correct.

MR. ERWIN: I guess my last comment then is I find it incredible that the sampling that you're using for your monthly report is being supplied by those people who initially poisoned the water to begin with. Thank you.

MR. DeANGELO: I understand your concern. However, I'm not in a position to defend National Southwire, but it's in their best interests to do the best job they can analyzing contaminants in the water and to produce valid results because they know that EPA and the State can come in at any time and take split samples and if they're screwing up, messing up, then we'll find out about it.

MR. ERWIN: Have you done that often?

MR. DeANGELO: We did, we've done split samples in the past but not recently.

MR. BEAVER: Have you done that without a warrant?

MR. DeANGELO: We don't need a warrant to do that. Yes, sir?

MR. GAYNOR: My name is Mike Gaynor, G-A-Y-N-O-R, and I have a couple of questions. Several years ago the Agency for Toxic Substance and Disease

Registry came in and did a site look-around of NSA and they came up with a list of recommendations that they had for NSA to do and one of those recommendations was that there be a sampling of private wells within half a mile of the site itself. Has that been done and if it has been, who does that?

MR. DeANGELO: I believe that has been done. If memory serves, I believe the results are in the Remedial Investigation. I don't recall whether the EPA or the State did that, but I know for certain that NSA's contractor has done that. Is that not correct, Mr. Sands? I would have to go back and look at the Remedial Investigation documents. I know they've been sampled, exactly who and when I don't recall.

MR. GAYNOR: So you wouldn't recall what the samples turned up as far as was there any pollution, any contaminants found within a half of mile of private wells.

MR. DeANGELO: I don't believe any of them came up hot. I know that quite some time ago, in the !70s, there were wells on site that were used for production, water used for production. I know that the water was also used for potable water on the site, people were actually drinking it. I know that wells that were contaminated were shut down and now water for drinking, et cetera, is supplied by the public water system. The question in my mind is of these private wells, what are they being used for, are people actually drinking, still drinking water from them. I, think most everybody is probably on the public water supply, but I'd have to go back and look.

MR. GAYNOR: Down in that area I don't think they have a public water supply available, do they?

UNIDENTIFIED: Not everywhere.

MR. DeANGELO: Then we'll have to take another look at that.

MR. GAYNOR: How long a period of time is this annual sampling -- has it ceased now or has it ceased just recently or is it something that's supposed to go on for several years until this problem on site is taken care of?

MR. DeANGELO: You mean annual sampling of --

MR. GAYNOR: Private wells.

MR. DeANGELO: As far as I know that's been stopped, at least on the part of the EPA for several years.

MR. GAYNOR: My other question is this: NSA is for sale right now. If we ask for and receive a thirty-day extension and NSA is sold in that interim time, who is responsible for what is left to be cleaned up at that time?

MR. DeANGELO: NSA is still responsible. They are the one and only Potentially Responsible Party. Now, the way attorneys work they may find some way to, they may come up with some arrangement where the new owners, where they share costs or the costs are transferred, but I can't really speak at this time to that particular point. NSA is still responsible. Now the new owner may also be responsible under the present Superfund Law, because they know about the contamination and they're purchasing a property with that proviso.

MR. GAYNOR: Would they be co-responsible or would they assume full responsibility?

MR. DeANGELO: I think it's co-responsible.

MR. GAYNOR: I have one other question. It goes along with Mr. Beaver's question earlier about air particulate emissions. Also in that recommendation that the Agency for Toxic Substances and Disease Registry listed was the sampling of garden produce adjacent to the plant site and also the sampling of ground, surface soil, in the adjacent agricultural property next to the site, is that something that has been dope and is an ongoing sample or is that something that has been done one time and has ceased now, do you know?

MR. DeANGELO: I don't recall, I don't think the produce has been sampled ever as far as I know. The soils, that may be, another thing, I don't recall any time where all the, you know, the agricultural area was sampled in a big way. In fact, I don't remember that it has been.

MR. GAYNOR: As I understand it, the soil was supposed to be sampled within an eight-mile radius. Is that right?

MR. BEAVER: In respect to the vegetables were found to have anywhere from point four parts per million fluoride to two hundred fifty-two parts per million. That's within an eight-mile radius.

MR. DeANGELO: I'm not familiar with the details on that, but I'll go back and take a look.

MR. GAYNOR: Do criteria like this figure into your all's assessment of whether or not we get an extension if we ask for one?

MR. DeANGELO: You can ask, and you can ask for an extension any time. Those other things are not really a factor in an extension. It gives us a lot more time to consider things and more time to comment. All you've got to do is make a formal request.

MR. GAYNOR: Thank you.

MR. BEAVER: Let's go back to where you mentioned about the fluorides in the vegetables. I notice within this Remedial Action Plan here that the ecological risks they say was at a minimum. Wouldn't we be looking at that? Wouldn't that be considered when you say ecological risks, that and the fact that the Ohio River is already ranked five out of six most serious rivers, polluted rivers.

MR. DeANGELO: Well if we would consider those items that you mentioned. I don't -- the thing is that what we're looking at is trying to take care of or remediate the problem areas. We're not trying to remediate the entire area around the site, just the problem areas. Now if you figure that the item that you're talking about is another problem area, then feel free to write in and say that, but you've got to make some kind of suggestion that this be sampled or samples be analyzed, be sampled annually,

semi-annually, monthly --
MR. BEAVER: I believe they send samples in with their annual TRI if I'm not mistaken. I know that they do send vegetable samples in. I'm not really for sure when they send them in.
MR. DeANGELO: I'm not familiar with the details of that.
MR. SHOUSE: One more question. On the hot spots when they start digging the hot spots, no matter which one of these areas they are, would there be an EPA representative or somebody from the State there when they do that? You may get into something that nobody knows.
MR. DeANGELO: Once we start the design and construction we will have representatives. either EPA people is or our contractors that will be out there virtually every day while construction was going on, and they'll be taking voluminous notes and taking pictures and possibly doing split samples.
MR. SHOUSH: Thank you very much.
MR. BEAVER: One more concern for you, Tony - on the map, on the north, would be the northern part where all these units are here, there's no structures. I wonder what the reasoning is for capped, because the natural flow would be

toward the north and seems like all these leaches through the years have already washed here and will in-the near future even with a cap.

MR. DeANGELO: Well, most of the year here the river is down and I think you would agree with that statement. You put a cap on Taylors Wash Landfill to eliminate the possibility that, essentially, the rainfall is going to infiltrate directly vertically down through the contaminated material that's there. Certainly when the river comes up, there's a delay and then there’s lateral flow into that area and then when the river goes down there's another delay before it flows back out and these delays are quite long in that particular area because of the geology.

MR. BEAVER: Well, let me ask you this, would the last seven years that all this has been taking place, wouldn't it change the dimensions of the dumps themselves. I mean, how would they know how far to put the cap. Is there going to be more testing done to figure out the--

MR. DeANGELO: My understanding is that Dames and Moore has already been out there and they've taken subsurface samples, looked at the topography, the lay of the land. I also believe they have gone over documents and found out exactly where the outline of Taylors Wash is, so they know. The, cap will go over the edge certainly so they're covering more of the patch to covert but they know where it is.

MR. BEAVER: But naturally it's going to be bigger than what it was when we first started.

MR. DeANGELO: The cap will overlap the edges.

MR. SHOUSE: Dames and Moore is paid by Southwire, right?

MR. DeANGELO: Correct.

MR. FRAIZE: I'd like to know what does the State recommend and why?

MR. LIEBENAUER: Eric Liebenauer again. At this point we haven't of course, since this proposed plan received all the details of how the decision will be implemented, but once we do receive the plan it still has to go back to our Office of Legal Services people and to our management, but the three of us in the room feel that it's actually a pretty good plan. We feel like Southwire and EPA have both worked with us well on this.

MR. FRAIZE: Which plan is that?

MR. LIEBENAUER: Wells, all the plans, all the different plans for Taylors Wash. Do you have a specific question about how we feel about the --

MR. FRAIZE: Well, there's so many different alternatives here, I just wondered which one that --

MR. LIEBENAUER: Well, the one that's been selected, 5A and B, or the mixture of the two. It's listed on Page 9, Proposed Preferred Alternative.

MR. BEAVER: John Beaver, once again. I've got a question. The only difference between Alternative 5 and Alternative 6 was that the Green Carbon PCB Spill Area and in Alternative 6 you're willing to excavate to ten milligram per kilogram for remediation. Why don't we look at that for the Taylors Wash Area and the PCB Soil Stockpile Area? Why is it just looked at the Green Carbon Area where it's more feasible for Southwire to do that remediation where there's no structures? And furthermore, on the South Slurry Pond, who's in charge of maintaining Southwire, Dames and Moore, and do they report on the maintenance.

MR. DeANGELO: Southwire is responsible for the maintenance of the Old South Slurry Pond cap. What they're talking, what you were talking about is the difference between the two alternatives, or two variants of Alternative 5 and three variants of Alternative 6. Alternative 6 is basically complete removal, like, just taking up all the PCB-contaminated soils and you're taking them and dumping them essentially in someone else's back yard, so there is a phenomenal cubic yardage and tonnage of material that you're talking about. You're talking about trucks traveling down your public roads, large trucks traveling down your public roads, with PCB-contaminated soils, and you're talking about phenomenal transportation expense also.

MR. BEAVER: Well, what I'm talking about is half of Alternative 6 and half of Alternative 5. Why do we have to go with either all of Alternative 5 or all of Alternative 6? Why can't this stockpile area be, why can't we call this ecological, this place in Canada, have them come in and treat that area. Why do we just have to cap it?

MR. DeANGELO: Well, once again you’re looking at the risks that are involved. Can we contain the problem for a long time so that there is no risks to the people who would normally be in the area?

MR. BEAVER: Well, it's already been contained for seven years, hasn't it? That's what --

MR. DeANGELO: Which area?

MR. BEAVER: That's my understanding. I'm hoping all of them. I'm hoping all of them are contained. I mean, you know, seriously all we want is the best possible remedial action and I feel like that's it, is to go in and they call a corporation like this that's got newer technology to treat the ground. We're treating the water this way. Why do we do the ground any different?

MR. DeANGELO: Well, I take it that's your comment and you want that to be considered. Please write it down.

MS. GIBSON: Did you have a question, sir?

MR. CECIL Well, Tim Cecil. How do you know that Southwire and this other, company, you know what I'm trying to say here, if Paul puts a big bushel of tomatoes in Leroy's car, you know, how do we know that the samples you're getting -- you're getting true samples, in other words? Looks like to me the EPA ought to have a man come in, you know, that has nothing to do with Southwire or this contractor and check with their samples, you know.

MR. DeANGELO: Well, when NSA and Southwire wanted to do some of their own sampling and wanted to contract out the samples, we asked them, "Well, what lab are you sending, them to or what labs are you sending it to, sending the samples to for analysis?" And we have our lab over in Athens which has all the latest equipment and knows about all the labs in the region, we asked them, "What is your opinion of the quality of the analyses that comes out of the labs that NSA and Southwire have recommended?", and if they don't, if our lab over in Athens does not have any problem with the quality of the work that that lab, those labs are doing, then there's no reason for us to question. However, we can take some split samples. In other words, they take a sample and we take a sample at the same time. We send our sample to our lab and they send their sample to their. lab and then we compare the results.

MR. CECIL: But how often does that happen?

MR. DeANGELO: That has not happened recently. There has been no real reason for that to happen at this point. Now if you want us to do that more often --

MR. CECIL: Well, I Im just saying it looks like to me there ought to be a little watchdogging here where you know you're getting the samples, you know...

MR.DeANGELO: Well, we'll certainly consider that. If we can dig up the money --

MR. BEAVER: If I may, let me just add on to his comment. You know, I think we all, everybody in this room would feel more comfortable if we, the community, could get a consulting firm, whether it be through NSA, help from NSA Southwire or a grant that we spoke of earlier to kind of lead us in the proper direction that we need to be going. We need to know as a community is all of the options listed in this Remedial Action Plan because it's obvious that it's not because ground treatment is just one that we've discovered within the week and a half that we've known about this meeting of options that are out there. Do you understand what I'm saying?

MR. DeANGELO: Well, if you want a technical assistance grant, I can give you the name of the lady at the EPA that you can talk to. She'll tell you what type of timeframes you're looking at in this situation, also how much money is available. Right now money is a sticking point. You know, if they can dig up twenty-five thousand, fifty thousand bucks, all the better. I'm not certain that the money is there, but it doesn't hurt to ask.

MS. GIBSON: I can give you her name and then I can also give her your name. There is an application process to go through for technical assistance from them, but it is made available and it has been made available at some point and maybe that was missed somewhere along the process, but it is made available to citizens as a way to get unbiased technical consultants to go over the various reports and samples that are produced during the remediation.

MR. BEAVER: Well, would it be out of the ordinary for Southwire to have a second opinion on this, I mean, as far as the Remedial Action Plan would it be out of the ordinary for us to request something like that?

MR. DeANGELO: Well, if you can get Southwire to do that. Anything else? Yes.

MR. GIVENS: My name is Hurtis Givens, first name’s spelled, H-U-R-T-I-S. Just a point of clarification. Has there ever been issues with PCBs coming from the Taylors Wash leachate.

MR. DeANGELO: I know there are PCBs in the leachate.

MR. GIVENS: There are?

MR. DeANGELO: Yes.

MR. GIVENS: And that leachate, you’d mentioned earlier, is going over to the ground water treatment plant?

MR. DeANGELO: Right.

MR. GIVENS: Thank you.

MS. GIBSON: Please be sure that you signed in so that we can get our mailing list up to date. If you didn’t get a copy of the overheads and would like a copy of those mailed to you, let me know and I'll make sure you get a copy, and get an envelope on your way out if you’d like to.

MS. HOSSLER: Candy Hossler from Tell City. I just had one last comment. Something you said a while ago has really been bothiring me the whole time. You said basically everybody else is doing it, so why shouldn’t we. Why shouldn’t Southwire be the first one to start cleaning the Ohio River up? I mean, turn things around, instead of doing what everybody else is doing negatively and be the first one to do something positive.

MR. DeANGELO: Once again, I cannot speak for Southwire. The purpose of the Superfund activity in this situation is to take care of the worst parts of the problem. Southwire is pumping and treating the ground water, the plumes that we’ve been able to establish, and they are discharging under the standards that have been set, not only the standards that have been set by the federal government, but also by the state government. As I said they do regular sampling and analysis to demonstrate that, so in that way they’re doing something about the river. As far as all these other problems, any time you have industrial activity along the river you’re going to get some contamination of the river. Yes, there are other problems upstream and downstream. The question, once again, is how clean, you know, how clean do you want to get it and you know, but the question you had about Southwire being the first one, once again, I can't speak for them. They're doing something of consequence in the activities that they're undertaking at the present time.

MR. FRAIZE: One more thing. Do they discharge the same thing at night as they do in the daytime?

MR. DeANGELO: Um-hum, far as I know, but I'm not there to sample and analyze.

MR. FRAIZE: Well, I know of occasions where -- well, I'd better not get into that. I'll probably get perturbed if I do.

MR. BEAVER: Who makes the decision -- what does the law say? Ultimately how far do they have to go according to the law?

MR. DeANGELO: You mean on the ground water?

MR. BEAVER: Well, all of it, the ground water, I mean, all of it, because all of these minor problems are going to end up being a major problem. If we keep allowing corporations to accumulate minor problems, eventually we're going to have major problems.

MR. DeANGELO: Well, in terms of the ground water and the treatment and the discharge to the Ohio River, if you have some idea of the way the discharge elimination system works, basically you have to demonstrate in the permit that what you’re putting into the river is not going to cause a larger problem than what’s there already and in fact, it has to work to actually clean the river, and they go through a lot of "mixing scenarios" where so much water flow is along with what’s coming out of the pipe and they look at what the concentrations are at the pipe when the liquid’s coming out and what’s downriver, given certain assumptions. So, you know, all of those things are factored in, but once again, you come to a point where if you have all this, if you’re treating this water and you’re spending a lot of time and money treating the water to discharge it to the river, why would I want to do that? Why not just use that clean water over again in the process?

MR. BEAVER: Well, yeah, I guess what I’m trying to get to according to CERCLA they have to return it to the way it was before. Am I not right?

MR. DeANGELO: No. It’s all ... most of it’s done in terms of risk scenarios. In other words, what amount of contamination near or downstream or immediately downstream from the pipe is going to effect the flora, the fauna, the fish, perhaps whatever, that are in that location, so ecological people get involved in that, but the fact of the matter is you can put somewhat contaminated water into the river. In fact, it’s done every day and you also have run-off of all these populated areas. You know all the water that runs down the street -- you have a car dripping oil or transmission fluid, what happens to that oil and transmission fluid when it rains? Where does it go? Down to the river. And when the lady indicated, you know, that everybody’s doing it, all of us are doing it to one degree or another. The question is: is National Southwire doing the best job it can to discharge liquid that is not going to cause harmful effects?

MR. BEAVER: But are they?

MR. DeANGELO: Well--

MR. BEAVER: Over the last eight years their emission of toxicants have increased by a hundred and twenty-five percent.

MR. DeANGELO: Well, once again, if you have, you can demonstrate that and make references to whatever documents you have, please do that. We'll be glad to consider that information.

MS. ALLEN: My name is Cathy Allen and I'd like to go back to a question that was asked earlier about the aquifer and the possibility of contaminants getting in that and going across the river and stuff and you didn't really, and I'm sure you probably don't know if all water treatment facilities are testing for all the contaminants that are on Southwire's property. Am I correct in that?

MR. DeANGELO: I don't know --

MS. ALLEN: You have no idea if they're checking for those or not?

MR. DeANGELO: I don't know if the municipal water supply in Tell City or Cannelton is testing for all those. Presumably the environmental regulatory body in Indiana is making them do samples. Certainly EPA has regulatory standards where these municipal water supplies have to test what is going into the plant and what's coming out of the plant. As far as ground water contamination affecting the other side of the river, that's doubtful simply because of the hydrology, simply because of the way the water flows. Everything's going to eventually go down the river. It's not going to go across and under the river.

UNIDENTIFIED: There was a question that I had once you start speaking about across the river. I mean, to me with the hydrology and the way it works your ground water essentially flows into the river anyway.

MR. DeANGELO: The effects are --

MS. ALLEN: But in this statement here, you know, it says that most of these water consumers live across the river from the site and that the aquifer -- you know, the thing that concerns me is who is responsible -- I mean, you know, heaven forbid that anything ever happened and maybe by the laws of nature it shouldn't, but things have happened. Who is responsible to allow the water companies around here to know we have these contaminants on this property? We are trying to take care of this, but we want you to know you might need to test for this. You know, who's -- I've lived here for ten years. My husband has been an employee of NSA for almost thirty years. I didn't know about any of this, you know, until all this started coming out and it's been there for years. Who is really responsible to tell me and my family about this or do I have to wait until they finally come up with a plan to correct it after we've all maybe been put right out there to it.

MR. DeANGELO: Well, my answer is the municipal water supply company is testing what's going into their pipe, what comes out of their pipe and out of your faucet at home and --

MS. ALLEN: But are they aware of what contaminants are on this property because I was not aware of it until tonight what some of these contaminants were. I'm saying do they know what contaminants they're supposed to be looking for. You know, I realize`they have a list of contaminants that they are looking for but are they looking for these? Are these common to be looking for in all water facility plants.

MR. DeANGELO: What I can do is call the engineer at the municipal water supply and get you an answer.

MS. ALLEN: Thank you.

MR. DeANGELO: Any other questions?

MR. BEAVER: This is more or less a comment with regard to what this gentleman was saying a while ago about Indiana being involved. Well, during the preliminary health assessment of this site it was investigated that Evansville, Indiana pumps their municipal water straight out of the Ohio River. There’s something else that’s not in this remedial plan. It has a great potential to affect a lot of people.

MR. DeANGELO: Well, the NSA Superfund site is basically the facility. We consider where their discharges go to, the river, but normally we don’t go beyond the facility. Indiana is well aware of what is in the Ohio River. In fact, we saw a couple of their Chevy Suburbans and their boats earlier today and it looked like they were sampling for fish --

MS. GIBSON: Fish tissue samples.

MR. DeANGELO: So there are people that are working on that maintaining an eye on the problem.

MS. GIBSON: Indiana, of course, has their own state environmental department and also Indiana is within another region of the Environmental Protection Agency. It’s Region 5. Their headquarters is in Chicago and if you don’t have their contacts, I can get those for you.

UNIDENTIFIED: Who did you say was taking samples?

MS. GIBSON: The Ohio River Valley.

MS. HOSSLER: Apparently it must have been of some concern because it was in the Perry County news.

MR. DeANGELO: What was?

MS. HOSSLER: The notice of this meeting.

MS. GIBSON: Sure. We've included Evansville and Tell City and Cannelton.

MR. DeANGELO: Some of the employees of NSA live over in Indiana.

MS. GIBSON: And because you're surrounding this area we try to include everybody, and I'm relatively certain, I'll have to check and I've made a note, about checking with the municipal water people in Tell City, but I believe they're on the mailing list, but I'll check that for sure as well.

MR. LIEBENAUER: I think I should say something. Eric Liebenauer again. The question's come up and I guess you all are pretty concerned about the drinking water around here and the question you asked, who's responsible for making sure that our municipalities know to be testing for this stuff. You point out there's a lot of contaminants on site and your question is do they sample at the well head or whatever before it's sent up to your taps with all these contaminants. The answer's probably no. I believe they're required to sample for less under the Safe Drinking Water Act and Tony and I then are also responsible for making sure that the contaminants at this site are not going to anyone's municipal supply wells and we've done that. What normally we do with a site is when we discover this contamination in the ground water, can I borrow the map of the main facility, is we try to determine the limit of the plume. We do that to our satisfaction by finding wells that have clean drinkable water around the edges of the plume. Now as most of you know, this is the Ohio River on the site and water flows this direction. That means that ground water travels under the plant except in times when the river rises. It flows this way (indicating). It flows from over here (indicating) across. This area (indicating) is a major area of cyanide contamination on this site. This area (indicating) is the major area of PCB contamination at the site. There are wells in these areas that are not fit for drinking. Levels of contaminants at these points are above the maximum contaminant level or MCL. However, there's wells around the perimeter of this site and down here near the river where the levels aren't that high, so we feel that we know where the unsafe levels of drinking water are. They're on the site. In addition NSA is pumping several wells down here by the river sending that water through a groundwater treatment plant and then discharging it back to the river with what's called a KPDES permit, which means that there are prescribed limits above which they can't discharge that are considered to be safe both for human contact and for the biota in the river. So if there was municipal supply wells north of this site, across the river, south of the site and we felt that we didn't know where the plume was, we'd walk out there. We'd grab a sample for ourselves and run it through the state lab, and EPA would probably do the same thing for you if you asked. So yes, we are responsible but we don't feel that that's a concern. We know where the safe water is; we know where the contaminated water is.

MR. BEAVER: Well it appears to be obvious to me that there's a problem here somewhere because the EPA, let's see, yeah, the EPA rates the Ohio River the most persistent and -- it's highest of most persistent metals.

MR. LIEBENAUER: I would have to agree with you that there is a problem --

MR. BEAVER: And you know a lot of these metals, there you go are listed in the contaminants.

MR. LIEBENAUER: No, you're absolutely right. There's a problem somewhere. The Ohio is a dirty river.

MR. BEAVER: Right. Well, what I'm saying is shouldn't there be a time when we say, you know, enough's enough and start a new trend, say, well, okay, this site has dumped and got these toxicants on their land and we should not be allowed to go any further.

MR. LIEBENAUER: That's the kind of question that the answer applies not just to NSA but to all facilities. Is that kind of how I'm reading you?

MR. BEAVER: Well, yeah.

MR. LIEBENAUER: And I can actually appreciate that. I'm a member of the Nature Conservationists and things like that. I actually have some question in my mind where KPDES limits and that sort of thing. However, we have to take that up in places like the legislature, you know. Tony and I are basically people on the bottom rung. We enforce the laws. If we want to change the laws -- actually I kind of appreciate your sentiment, but right now we have a law and we have to act within it and NSA has permission to discharge so much to the Ohio.

MR. BEAVER: Well, what I'm asking is you previously said that according to the laws what they're discharging is safe. Then you turn around and say that the river has got more toxicants than what should be. Well, obviously somebody is putting something in the river that we don't know about.

MR. LIEBENAUER: I think you're right. That's true.

UNIDENTIFIED: But the Ohio River is a very long river with a lot of industry along it.

MR. BEAVER: Well, let's use that argument. Let's use fluoride, for example. Fluoride before it gets to NSA is at a bare minimum. At Evansville it's one and a half parts per million.

MR. LIEBENAUER: Well, I guess my further comment about the fact that there's water on site that's undrinkable due to fluoride applies, yeah. There's a fluoride problem at NSA, but it doesn't go all the way down the river and even if it did, we have extraction wells along the river here at the north portion of the site that would get it and send it back to the ground water treatment plant.

MR. BEAVER: Okay, and another question that concerns the same thing, do they test the spill water into the ditch.

MR. LIEBENAUER: Yeah, KDEP has a permit there.

MR. BEAVER: Y'all do?

MR. LIEBENAUER: Yeah, and your question earlier about who watches the watchers, you know, did these people employ their own lab sometime? Well, that's a legitimate question. We at the State ask ourselves that a fair amount, which labs can we trust and which labs can't we trust, and sometimes we determine that indeed people should be watched more closely and we should split samples with them and if you'd like us to split samples at the NSA site either now for the water samples or during the cleanup, we can certainly arrange that. That's not a problem. EPA has a budget and they have to operate within that. Sometimes that's a problem for them, but for us effectively we can do that sort of work when we need to.

MR. BEAVER: When they -- if they report something, I know in the past I've read it in the reports that they reported that they found some gray stuff in the ditch and then it never went any further. Was there ever a question that arised, that arosed, that was raised up?

MR. LIEBENAUER: Well, the law in Kentucky is 224.01-400. That's called the Spill Reporting and Release Law, and what that says, if they spill a substance above what is called a Reportable Quantity, they have to notify us and take steps to clean it up. It was a gray substance. I'm not exactly sure when it happened or what they did about it, but if they could identify it as something on that list of things they have to notify us about, then they should have notified us and cleaned it up.

MR. BEAVER: Well, wouldn't you want to know what it was, whether it was --

MR. LIEBENAUER: Sure, but at some point, if somebody says hey, I know they're dumping gray stuff and they know it's something bad, then normally we get a call, we come out there and sample it. Sometimes it's just that, it's just gray stuff and it doesn't, you know -- at some point we -- we don't know what they did is what I'm trying to say, and you know, if you think that that's going on as a habit and you want us to check it out and you let us know when it happens next, but until that point we trust them to, we trust them to do the right thing, and here's why. It's because we can't be everywhere at once and they know the law.

MR. BEAVER: Well, I guess the point I'm trying to get to is when you got, you got somebody that's been like this in the past, I mean, you wouldn't go get heart surgery done without a second opinion.

MR. LIEBENAUER: Absolutely not.

MR. BEAVER: I mean, okay, so why are we going to go get our environment cleaned up without a second opinion.

MR. LIEBENAUER: You want a tag, a grant to hire a consultant.

MR. BEAVER: Right.

MR. LIEBENAUER: The state can't provide you money for that. I'm sorry, but you can consider us your consultant for this site. That may sound -- I know you don't know me, but I'll be happy to let you call me any time. I've got another card you can have and we consider it our jobs to make sure this cleanup goes well and that you get the best job done that's possible under the law.

MR. BEAVER: So you honestly thing Alternative 5 is a great plan?

MR. LIEBENAUER: I think it meets the requirements of the law, you know, I feel that it does. Our legal people actually say whether it does. I'm just an engineer, but I know that Alternative 5 is actually a lot more than a lot of people thought was going to happen when this site opened up, just to be honest with you. We actually feel pretty good about it.

MR. FRAIZE: Again, I have to ask about earthquakes. I'm scared of earthquakes.

MR. LIEBENAUER: If you're a smart man, you are.

MR. FRAIZE: I live in a fall area anyway and this being a fall area, what’s going to happen if we have a tremor.

MR. LIEBENAUER: What type of contaminant or specific site is near you --

MR. FRAIZE: The whole kit and caboodle there.

MR. LIEBENAUER: To try and answer your question, is an earthquake going to destroy everything we’re trying to do at this site, and there’s not much we can do right now to reassure you that contaminants won’t be broken loose again if there’s a earthquake. I wish I could give you a better answer, that we can design all landfill covers to stop all earthquakes and that we can implement some kind of remedy out here that will keep everything right where it’s supposed to be, right where it is now. The answer is "no", we can’t. If there’s an earthquake we would be, our division would be, put on notice that we have to come look at things like are the landfill covers intact and NSA should do that as well and they probably will, but we’ll be there to help and watch them do it.

UNIDENTIFIED: Wouldn’t you also agree that during an earthquake that would be of a significant magnitude to disturb the remediated sites, you would have more of an acute hazard with a house falling down on your head than a disturbance of an area like this.

MR. LIEBENAUER: Well, that would be a secondary concern compared to providing food and water and shelter. Sure, but that's someone else's job. That's emergency services' job. Our job is to take sure that the landfill covers are intact. We'd get to it. We probably wouldn't come out while the emergency crews are still there, but we'd get to it.

MS ALLEN: Is this the only problem area in Hancock County?

MR. LIEBENAUER: Since there are more facilities, I'd have to say "no". However this is the only site that's in Hancock County on the National Priority List, which means that under the CERCLA law it's been identified as being one of the worst sites in the nation.

MS. ALLEN: In the nation?

MR. LIEBENAUER: Yes, that's correct.

MS. ALLEN: Oh, thank you. I'll sleep good tonight.

MR. BEAVER: Wouldn't a priority be when you first found this and you fast-tracked the ground water treatment plant? Wouldn't a priority be for better monitoring and technological reduction in emissions? I mean, it's surprising how Hancock County's total emissions have decreased, yet Southwire's emissions have increased dramatically.

MR. LIEBENAUER: Their air emissions, I guess you're --

MR. BEAVER: That's what I'm asking you. Well, that's all I've got data on.

MR. LIEBENAUER: Right, right. Well, I guess, you know, you probably go to the TRI to get your data and I can understand you might be a little concerned about that, but as long as they're not violating their air quality permits, then they're within their legal rights. I know that may not be a satisfying answer, but that's the way the law's written right now.

MR. BEAVER: Who goes over that information?

MR. LIEBENAUER: The short answer is the Division for Air Quality. I'm not sure who exactly, but if you want to call me, I'll find out who. I'll give you my card after the meeting.

UNIDENTIFIED: That would be Ed Frazier, who is the supervisor of the Metallurgy Section.

MR. DeANGELO: I would encourage anyone who has concerns, comments, we have self-addressed stamped envelopes, sit down take paper and pen in hand and formalize them. We want to consider all of them, and if nobody has any more questions, I guess that’s it for the evening.

MEETING ADJOURNED AT 9:00 P.M.

STATE OF KENTUCKY

COUNTY OF HOPKINS

I, Victoria Weisman, a Notary Public within and for the State at Large, do hereby certify that foregoing is a true and accurate transcript of the proceedings as taken by in shorthand writing at the time and place aforementioned.

Witness my signature this 1st day of September 1999.

Notary Public - State at Large

My commission expires May 14, 2000.

APPENDICES

APPENDIX B: PROPOSED PLAN FACT SHEET — July 1999

PROPOSED PLAN
FACT SHEET
for the
FINAL RECORD OF DECISION

July 1999

National Southwire Aluminum NPL Site
Hawesville, Hancock County, Kentucky

INTRODUCTION.

The National Southwire Aluminum facility is an active, operating aluminum refining operation. This Superfund National Priorities List (NPL) Site is located on a 1,100-acre tract of land in Hancock County, Kentucky. The Site is situated within the broad alluvial floodplain of the Ohio River of northwestern Kentucky, approximately thirty (30) miles east of Owensboro, Kentucky (Figure 1).

The Site enforcement activities are led by the United States Environmental Protection Agency (USEPA) and supported by the Kentucky Natural Resources and Environmental Protection Cabinet (Commonwealth or State or KDEP). The issuance of this Proposed Plan by the lead agency (USEPA) is required by CERCLA section 117(a).

The purposes of this Proposed Plan are:

- To identify the preferred alternatives for remedial action at the Site or operable unit and explain the reasons for the preference.
- To describe the other remedial options considered.
- To solicit public review of and comment on the alternatives described.
- To provide information on how the public can be involved in the remedy selection process.

The Proposed Plan highlights key information from the RI/FS Reports and the Administrative Record, but does not set forth the regulatory, technical, and scientific information in detail. The reader should consult the RI/FS Reports and the Administrative Record files for more detailed information regarding the Remedial Action.

Public input to the remedy selection process is important. New information or arguments derived from public comments will be considered by the lead agency (USEPA) and may result in a final remedial action that differs from the preferred alternative.

SITE BACKGROUND.

Site History.

The Site has been utilized from 1969 to the present, and is currently an active facility. The operation produces primary aluminum from alumina ore. Site features include a number of manufacturing and service buildings (Figure 2), three (3) former Site waste disposal impoundments, one (1) active wastewater impoundment, several former waste disposal landfills, a potliner accumulation building, and a drainage ditch. In the central-western portion of the Site is the Hancock County Airport. At the southeastern portion of the Site is the Southwire Rod and Cable Mill (a division of Southwire Company of

Carrollton, Georgia). Adjacent to the Site (northwest) is the Big Rivers Power Plant which supplies power for the NSA facility operations.

The production process and materials utilized are responsible for a variety of contaminants at the Site. These contaminants include but are not limited to: cyanide (CN), fluoride (F), arsenic (As), copper (Cu), iron (Fe), manganese (Mn), magnesium (Mg), nickel (Ni), zinc (Zn), beryllium (Be), titanium (Ti), vanadium (V), sodium (Na), gallium (Ga), and cadmium (Cd). Cyanide is produced as an impurity in the carbon linings of reduction vessels called "pots" during the production of aluminum. Appreciable amounts of total cyanide reside in the potliners at levels up to 2,500 ppm. The facility has over 400 active carbon-lined pots. The aluminum-reducing pots are operated continuously until the carbon liner begins to burn through. This takes approximately 5 to 10 years to occur. Once a pot begins to experience burn-through, it is taken out of service and replaced with a reconditioned pot. The decommissioned pot is prepared for use again by removing and replacing the carbon liner (potliner). In 1971, potliner removal began at the facility. In 1973, a concrete pad called the dump pad was constructed specifically for the removal of potliners.

In the late 1980's, the Commonwealth of Kentucky referred the Site to USEPA for ranking under the Hazard Ranking System (HRS). In 1990 and 1991, samples from surface soils, subsurface soils, sediments, surface waters, monitoring wells, industrial wells, and some private wells were collected during the USEPA Preliminary Field Investigation (April 1991). The HRS Score generated for the NSA Site was 50.0 out of a possible 100.0 points. Conclusions from the Report indicated that on-site ground water, soils, and drainage ditch sediments contain significant levels of cyanide, fluoride, and metals. NSA cleaned out a drainage/effluent ditch that was found to contain significant concentrations of fluoride and metals. In anticipation of the Site being listed as final on the NPL, NSA (through its consultants) also collected additional data regarding the environmental condition of the NSA property.

The NSA Site was proposed for inclusion on the **National Priorities List (NPL),** as defined in Section 105 of CERCLA, as amended by SARA (P.L. 99-499), in July 29,1991. The NSA Site was finally listed on the NPL on May 31, 1994.

In September 1992, NSA signed an Administrative Order on Consent (AOC) to perform a Remedial Investigation/Feasibility Study (RI/FS). NSA, through its contractors, performed the RI and has submitted the draft RI and FS Reports. The USEPA and the Commonwealth are overseeing all RI/FS and related Site study activities to ensure compliance with all applicable laws and regulations and to ensure that the work proceeds in a timely manner. A Risk Assessment is also part of these studies.

In 1991, during the excavation of a cooling tower foundation near the eastern portion of the Site, polychlorinated biphenyls (PCBs) were encountered at approximately twelve (12) feet below land surface. NSA coordinated an investigative effort on this contamination with the USEPA Toxic Substances Control Unit. Sampling and analyses were conducted in order to characterize contaminant levels within the cooling tower foundation. Sheet pilings at the excavation were grouted to prevent additional PCB oils from entering the excavation. Forty-two (42) composite samples were subsequently taken of the PCB-contaminated soils temporarily stored at an on-Site staging area. NSA removed approximately 850 cubic yards of PCB-contaminated soils at the excavation for a cooling tower footing. One hundred thirty (130) truck loads of PCB-contaminated soils were transported and disposed at the Chemical Waste Management facility in Emelle, Alabama. During this sampling event, PCB levels were detected in these soils from below 1 ppm to approximately 8,940 ppm. These areas have been further investigated under the Superfund Remedial Program and will be addressed as part of the final Site remedy.

Site Characteristics.

The NSA Site is located in the broad Ohio River Valley floodplain. The geographic coordinates are 35E56'42" N latitude and 86E47'16" W longitude. This area is within the Central Lowland Physiographic Province and is located adjacent to the northern boundary of the Western Coal Field region of Kentucky. The land surface is characterized by very low relief and lies approximately forty (40) feet above the normal water level of the Ohio River (358 ft amsl). The flood plain extends approximately one (1) mile west of the Site. At this location there is an escarpment approximately one hundred (100) feet in elevation.

Surface water drainage follows the low topographic relief at the Site. Relatively poor surface water drainage in the northwest and central portion of the Site is strongly influenced by impermeable clay and silt lenses. The one anomalous feature is the manmade drainage ditch that cuts across the Site generally from south to north, then east into the Ohio River.

A complete ecological assessment has been performed as part of the RI/FS. The Ohio River floodplain is generally populated by muskrats, beavers, various small vertebrates and invertebrates, songbirds and waterfowl. The River itself provides habitat for a number of fish and other vertebrates and invertebrates. The bullhead mussel and the orange-footed pearly mussel are species of concern. However, no confirmed occurrences of federal or state threatened or endangered species were found.

Releases from the NSA facility have contaminated the unconsolidated alluvial aquifer at the Site, which is used for industrial processes and was previously used for drinking water for about 1,000 plant employees. NSA found one of the three (3) on-site water supply wells to be contaminated with metals and cyanide at levels just below the Maximum Contaminant Levels (MCLs), and that well is no longer utilized as a source of potable water. The three (3) wells are currently being used only for industrial purposes and pump approximately 790,000 gallons per day (550 gallons per minute). Municipal water is now utilized for all potable water at the NSA Site.

The closest residential well is approximately 1/2 mile south-southeast of the Site. Numerous investigations indicate that contaminants are not migrating toward any of the residential wells. Reportedly, within a four-mile radius of the Site, several municipal water companies and several private wells obtain water from the alluvial aquifer, and more than 16,000 people obtain water from these sources. Most of these water consumers live across the Ohio River from the Site. According to the Kentucky Division of Waste Management's Site Investigation Report (1986), there are more than 1,500 persons utilizing the ground water for drinking purposes within three (3) miles of the Site. These people may not be served by the municipal water supply. Within a four-mile radius the alluvial aquifer is also used for industrial processes, cattle watering, and commercial food processing.

Public Participation.

Hancock County is primarily a rural community with two incorporated townships - Hawesville and Lewisport. Hancock County and its two municipalities were incorporated in the early 1800's. There has been slow growth in population in Hancock County since 1970. The 1990 population of Hancock County was 7,864. The 1990 population of Hawesville and Lewisport was 1,000 and 1,800, respectively.

Tell City and Perry County, Indiana, are located across the Ohio River from the NSA Site. Similar to Hancock County, Perry County is primarily rural and has three (3) incorporated townships - Tell City, Cannelton, and Troy. Tell City is the largest of the municipalities with a 1990 population of about 8,100. The 1990 population of Perry County was about 19,500.

NSA has played a major role in the local economy since it was established in 1969. The aluminum industry is the largest employer in Hancock County, with NSA sometimes employing over 1,000 people. NSA is well known throughout the community and is an active participant in Hancock County community and civic affairs.

The residents of communities surrounding the NSA Site, as well as many of the plant employees, are aware of Site activities that were initiated in the late 1960's. These people are also aware of the contamination that has been identified at the NSA Site. The Maceo Concerned Citizens Group, Inc.

was briefed about the NSA Site during USEPA community interviews in December, 1992. They had many questions concerning the type of contaminants at the Site, previous disposal activities, and what type of strategy would be implemented to clean up the Site. Overall, they were aware of many of the Site contamination problems and were knowledgeable of the Superfund Process.

The U.S. Environmental Protection Agency (USEPA) established a Public Comment Period from 1/7/93 to 2/7/93 for interested parties to comment on USEPA's Proposed Plan for the Interim Remedial Action at the NSA Site. No extensions were requested to the Public Comment Period. A Public Meeting was held on 1/19/93 and conducted by USEPA at the Hancock County Middle School near Hawesville, Kentucky. The meeting presented the results of previous investigations at the Site and described USEPA's conceptual approach to the future remediation of the NSA Site. USEPA also discussed the initiation of an RI/FS to acquire additional information so that a Final Site Remedy could be implemented.

In 1995 an Engineering Evaluation/Cost Analysis (EE/CA)described in detail the alternatives which would utilize containment and solidification of slurry wastes at the Old South Slurry Pond. The EE/CA was begun in the fall of 1994 and finalized in June 1995. Three (3) alternatives for closure of the Old South Slurry Pond were examined in detail. A Proposed Plan Fact Sheet was mailed to those interested individuals on the current mailing list during the first week of March 1995. A public meeting and availability session was held on March 2, 1995, in Lewisport, Kentucky. The public comment period extended from February 9 to March 9, 1995. A public notice appeared in local newspapers on February 23, 1995. Public comments were incorporated into the decision about the selected remedy.

SCOPE AND ROLE OF RESPONSE ACTION.

The Site is being addressed in three (3) phases which are supported by three (3) separate enforcement actions as follows:

I. A USEPA Administrative Order by Consent for a Remedial Investigation and Feasibility Study (RI/FS) of the entire Site was completed in September 1992. Due to intervening investigations, constructions, enforcement actions, and a plant strike by the United Steel Workers, the RI/FS was final in January 1999 and supports the completion of a Final Record of Decision and the start of final cleanup activities in 1999. In April 1999 USEPA was notified that the NSA facility was up for sale, but that the parent company, Southwire Company of Carrollton, Georgia, would continue to support the Superfund effort to remediate the remaining contaminated areas.

II. An Interim Record of Decision was issued in February 1993. A USEPA/State Consent Decree for a Remedial Design and Remedial Action was completed in April 1994. The Decree required NSA to design, construct, and operate a ground water extraction and treatment system to remove cyanide, fluoride, and heavy metals from the North and South Plumes, and to discharge the treated water to the River via a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The Consent Decree was fostered by USEPA, in concert with NSA, the State, and Clean Sites, Inc., and a Remedial Design and Remedial Action was begun under USEPA’s Superfund Accelerated Cleanup Model (SACM) initiative. Both the design and construction of the extraction wells and the treatment plant were fast-tracked and the systems were operational in June 1995. The million dollar plant will continue to operate until concentrations of contaminants in the ground water aquifer are consistently below standards set by the USEPA and the Commonwealth in the Interim ROD.

III. During the Remedial Investigation, cyanide was detected in the groundwater coming from under one of the old disposal ponds. USEPA determined that an old, uncapped, seven (7) acre pond needed to be properly capped and covered; and Engineering Evaluation and Cost Analysis (EE/CA) for the pond closure was completed in February 1995, a non-time critical removal Action Memorandum was issued in June 1995, and, after a negotiation period, **a USEPA Administrative Order by Consent for the removal was completed in October 1995.** NSA began the pond closure construction in the spring of 1996, when the construction season first allowed, and had installed the majority of the cover system before winter 1996. The completion of the cap and cover system construction occurred during the summer of 1997. Maintenance of the cap and cover, and sampling of monitoring wells continues under an operation and maintenance (O & M) plan enforced by USEPA and the Commonwealth.

SUMMARY OF SITE RISKS.

Human Health Risks.

According to the Risk Assessment, the cumulative risk for the three scenarios (i.e., general workers, maintenance workers, and visitors) is within the range of one chance in 10,000 to one chance in one million for excess cancer risk. In other words, while approximately thirty (30) per cent of the general population is expected to be affected by cancer during their lifetime, for those individuals that fall into the categories of general workers, maintenance workers, and Site visitors, the risks due to Site contamination add to that expected thirty (30) per cent lifetime chance of being affected by a cancer.

The Risk Assessment looker at five (5) main Site areas in which human exposure was possible and the most likely exposed groups in each exposure scenario.

1. Main Processing Area.
   Exposures in this area are primarily to Indoor Workers working within the plant itself.
2. Main Processing Area.
   Exposures in this area are also important to Maintenance Workers.
3. External Plant Area.
   Exposures in these areas are primarily important to Maintenance Workers.
4. External Plant Area.
   Exposures in these areas are also important to Visitors / Trespassers.
5. Refractory Brick Disposal Areas.
   Exposures in these areas are important to Visitors / Trespassers.

Ecological Risks.

The ecological risk assessment concluded that there were few adverse ecological effects associated with contamination at the Site. The conclusions were based upon the following points.

! The biota found at the Site are unlikely to encounter significant concentrations of inorganic compounds of potential concern, with the possible exception of fluoride. Fluoride toxicity determination and benchmark values seemed very conservative. Further, benchmark values were based upon research on the solubility and bioavailability of sodium fluoride. NSA collects forage samples for fluoride as part of its air monitoring permit for its air pollution control efforts and this chemical is closely monitored.

! Organic compounds of potential concern included benzo(a)pyrene, PCB Aroclor-1242, and PCB Aroclor-1248. As discussed previously, contamination by these organic compounds may be heavily localized and limited to areas affected by spills. The sampling and analytical data showed that, on average, these organic compounds were detected in about two-thirds of the samples taken. Sampling areas were addressed in such a way as to concentrate on areas affected by known spills, and 100% detection would have been expected. Contamination was found in a few limited areas.

! Contamination should be considered in the context of the entire local ecosystem. Photographs and Site investigations indicated that the land area outside of the main plant may not receive much long-term use by individual animals, and that with the exception of small mammals, animals that enter the Site are mostly occasional, transient visitors. The conclusion is based upon the lack of cover and perches in the area. Animals that visit the external plant area may receive only a small contaminant dose that is proportional to the time spent on-site. Many mammals and birds have large territories and overall exposure to the majority of individual animals could thus be expected to be very low.

! The External Plant and Refractory Brick Disposal Areas are made up of a very diverse conglomerate of ecosystems, soils, and vegetation. The diversity contributes to the overall resilience of the Site flora and fauna. Animals are likely to encounter a varied diet from areas with both high and low containment concentrations and differing bioavailability. The areas in the Refractory Brick Disposal Areas in which contaminants were concentrated made up approximately two per cent (2%) of the entire habitat (10 acres of the entire 425-acre plant site), and therefore total exposure could be expected to be very low. Further, the likelihood that the entire local population of a certain species would be exposed to contamination seems to be very low.

! Field reconnaissance indicated that the ecosystem at the Site is very resilient. Vegetation was growing vigorously and appeared to retain its natural diversity. Wildlife and wildlife tracks were observed.

! No endangered species were found at the Site and species observed on-site are common to the area. Considering the localized nature of the contamination (except fluoride) and the territorial behavior of most anumals, relatively few individuals of each species are expected to be exposed to the contaminants of potential concern. Exposures appear to be insignificant when considering the entire populations of shrew, mice, mink, deer, robins, hawks or fish in the area.

REMEDIATION OBJECTIVES.

The remediation will focus **on seven (7) major areas:**

1. the Green Carbon PCB Spill Area;
2. the Refractory Brick Disposal Area;
3. the Taylors Wash Area;
4. the Drum Storage Area;
5. the PCB Soil Stockpile Area;
6. the Site-Wide Groundwater;
7. the Old South Slurry Pond.

The general objective of the remediation is to significantly reduce the short-term and long-term risks of human ecological exposures to contaminants of concern by means of reduction of contaminant concentrations and by management and containment of contaminated media. The objective may be satisfied by the completion of certain tasks which may include:

! the sampling for hot spots in the two (2) Refractory Brick Disposal Areas and the construction of cap and cover systems and the implementation of institutional controls for the two (2) areas;

! the construction of a cap and cover system and institutional controls for the Taylor's Wash Landfill and the construction of an extraction and conveyance system for the Landfill leachate to be transferred to the Groundwater Treatment Plant at the main facility and treated with the extracted groundwater;

! the remediation of the Drum Storage Area;

! the remediation of the PCB Soil Stockpile Area, and vicinity;

! the remediation of the soils in the PCB Spill Investigation Area (Green Carbon Area);

! implementation of the pan for continued operation and modification of the Sitewide Groundwater Extraction and Treatment System;

! the implementation of other necessary sampling and analysis;

! the implementation of other institutional controls.

SUMMARY OF ALTERNATIVES.

Six (6) alternatives for Site cleanup were examined for feasibility. Descriptions of those alternatives were as follows:

Alternative 1 - No Action

No action means exactly that. No further remedial action would take place. This alternative provides no remedies, other than those achieved by naturally occurring processes. This alternative includes the shutdown of the GW P&T system, and no further maintenance of the Old South Slurry Pond closure cap, completed in 1997. Nothing further would be done about any of the PCB-contaminated areas on-site. Groundwater monitoring wells and piezometric wells would not be sampled.

Under **Alternative 1** the seven (7) Site focus areas would be treated as follows:

1. Green Carbon PCB Spill Area - No action.
2. Refractory Brick Disposal Areas - No action.
3. Taylors Wash Area - No action.
4. Drum Storage Area - No action.
5. PCB Soil Stockpile Area - No action.
6. Site-wide Groundwater - GWTP System shutdown and stop the groundwater monitoring program.
7. South Pond Closure/Post Closure - No further operation and maintenance.

Alternative 2 - Institutional Controls and Groundwater Monitoring

The Institutional Controls alternative is comprised of limited remedies which include site access and use restrictions, and passive remediation by naturally occurring processes. It includes (1) deed restrictions to prevent residential development, (2) fencing to prevent unauthorized access throughout the Site, and (3) continuation of the groundwater monitoring program.

Under Alternative 2 the seven (7) Site focus areas would be treated as follows:

1. Green Carbon PCB Spill Area - Deed restriction and groundwater monitoring.
2. Refractory Brick Disposal Area - Deed restriction and fencing.
3. Taylors Wash Area - Deed restriction.
4. Drum Storage Area - No action.
5. PCB Soil Stockpile Area - Deed restriction.
6. Site-wide Groundwater - Deed restriction; shutdown GWTP; monitor groundwater.
7. South Slurry Pond Closure/Post Closure - Deed restriction and monitor the groundwater.

Alternative 3 - Institutional and Operational Controls, Remediate Taylors Wash and Groundwater

This alternative provides additional protection by using operational controls to limit exposure to PCBs in the Green Carbon PCB Spill Area in particular. It also includes a cap for the Taylors Wash landfill to decrease potential for direct contact or release, and to decrease leachate generation from infiltration of precipitation.

Under Alternative 3 the seven (7) Site focus areas would be treated as follows:

1. Green Carbon PCB Spill Area - Deed restriction; operational controls; and groundwater monitoring.
2. Refractory Brick Disposal Area - Deed restriction and fencing.
3. Taylors Wash Area - Deed restriction; RCRA Subtitle D cap.
4. Drum Storage Area - No action.
5. PCB Soil Stockpile Area - Deed restriction.
6. Site-wide Groundwater - Deed restrictions and continue remedial actions; monitor groundwater.
7. South Slurry Pond Closure/Post Closure - Maintain; deed restriction; and monitor the groundwater.

Alternative 4 - Containment

This alternative provides containment for each of the main areas of concern - the refractory Brick Disposal Areas, and the Green Carbon PCB Spill Area. The Green Carbon PCB Spill Area erosion cap is designed as a paved surface suitable to carry the traffic in the area. Some removal of contaminated soil will occur during the preparation of the area for paving. The PCB Soil Stockpile Area and Drum Storage Area will be remediated by capping and hotspot removal, respectively. Leachate from Taylors Wash Area will be collected and disposed and a soil waste cap will be installed on the landfill. Alternative 4 also includes (1) operation of the Site groundwater pumping and treatment system, (2) groundwater monitoring, (3) Site access control through fencing, (4) legally enforceable controls to limit land-use to non-residential purposes, and (5) prevent groundwater exposure, and (6) maintenance of the Old South Slurry Pond Closure.

Under **Alternative 4** the seven (7) Site focus areas would be treated as follows:

1. Green Carbon PCB Spill Area - Deed restriction; paving in areas not already paved; operational controls to limit contact; and groundwater monitoring.
2. Refractory Brick Disposal Area - Deed restriction; soil erosion cap; and fencing.
3. Taylors Wash Area - Deed restriction; collect and dispose of leachate; RCRA Subtitle D cap.
4. Drum Storage Area - Excavate "hotspot" and dispose under Taylors Wash cap.
5. PCB Soil Stockpile Area - Deed restriction; soil erosion cap.
6. Site-wide Groundwater - Deed restrictions and continue remedial action operations; monitor groundwater.
7. South Slurry Pond Closure/Post Closure - Maintain; deed restriction; and monitor the groundwater.

Alternative 5 - Hotspot Removal and Containment (Two variations: 5A and 5B)

Alternative 5 adds a higher level of contaminant removal and containment. particularly removal of high PCB-concentration soils from the Green Carbon Area and the use of RCRA Subtitle C caps in both the Green Carbon and Taylors Wash Areas. The treatment/disposal of PCB-contaminated material may be by landfilling off-site or by thermal desorption.

Under Alternative 5 the seven (7) Site focus areas would be treated as follows:

1. Green Carbon PCB Spill Area - Deed restriction; hotspot removal; reroute utilities; low permeability multimedia cap; Operational controls to limit contact; monitor groundwater. Materials disposal: disposal in off-site landfill designated Alternative 5A; ex-situ thermal desorption in Alternative 5B.
2. Refractory Brick Disposal Area - Deed restriction; soil erosion cap; and fencing.
3. Taylors Wash Area - Deed restriction; collect and dispose of leachate; RCRA Subtitle C cap.
4. Drum Storage Area - Excavate "hot spot" and dispose under Taylors Wash cap.
5. PCB Stockpile Area - Excavate "hot spots" and dispose off-site.
6. Site-wide Groundwater - Deed restrictions; and continue remedial action operations, monitor groundwater.
7. South Slurry Pond Closure/Post Closure- Maintain; deed restriction, and monitor the groundwater.

Alternative 6 - Complete Removal (Three variations: 6A, 6B, 6C)

This alternative seeks to remove the majority of contaminants from the Site. Under this plan PCBs in the Green Carbon Area would be excavated to a remediation goal of 10 mg/kg total PCBs through the area. Removed soils would be disposed in one of the three (3) ways: off-site landfill, on-site TSCA compliant cell, or thermal desorption/incineration. In the refractory Brick Disposal Areas, all bricks and associated, materials, comprising up to five (5) feet of depth would be excavated and the material disposed offsite in an engineered landfill. This would effectively remove materials disposed in these areas, including the ancillary PAH and PCB contamination. The area would then be closed by partial backfilling and planting. Since most contaminants would have been removed, deed restrictions would be limited to those areas of the Site with remaining waste disposal units containing hazardous constituents (i.e., those areas east of Route 334 and north and east of the plant buildings). No additional fencing would be required.

Under **Altemative 6** the seven (7) Site focus area would be treated as follows:

1. Green Carbon PCB Spill Area -
   - Decommission structures and equipment and demolish;
   - Excavate to 10 mg/kg remediation standard;

- Disposal of PCB-contaminated materials: A - offsite landfill; B - onsite landfill; C - thermal desorption.
- Replace structures and utilities.

2. Refractory Brick Disposal Area - Deed restriction; soil erosion cap; and fencing.
3. Taylors Wash Area - Deed restriction; collect and dispose of leachate; RCRA Subtitle C cap.
4. Drum Storage Area - Excavate "hot spot" and dispose under Taylors Wash cap.
5. PCB Soil Stockpile Area - Excavate "hotspots" and dispose off-site.
6. Site-wide Groundwater - Deed restrictions; and continue remedial action operations; monitor groundwater.
7. South Slurry Pond Closure/Post Closure - Maintain; deed restriction; and monitor the groundwater.

EVALUATION OF ALTERNATIVES.

The six (6) alternatives were evaluated using nine (9) criteria which fall under three (3) criteria groups as follows:

! ***Threshold criteria,*** which must be met for an alternative to be eligible for selection.

- Overall protection of human health and the environment
- Compliance with laws and regulations.

! ***Primary balancing criteria***, which are used to weigh major trade-offs among alternatives.

- Long-term effectiveness and performance.
- Reduction of toxicity, mobility, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.

! ***Modifying criteria***, can be fully considered only after public comment is received on the Proposed Plan and are of equal importance to the balancing criteria.

- State acceptance.
- Community acceptance.

The evaluation process is really a process where alternatives not satisfying the criteria set forth by law and regulation are filtered out, and the alternative(s) that satisfies the criteria remains. Alternatives were first examined using the above two (2) ***threshold criteria***. Those alternatives satisfying the ***threshold criteria*** are then evaluated using the above-mentioned five (5) ***primary balancing criteria***. Then, those alternatives satisfying the ***primary balancing criteria*** are analyzed using the two (2) ***modifying criteria*** after the Public Meeting and the Comment Period are completed. The alternatives, or combinations of the alternatives, that satisfy the criteria chain are then further evaluated in order to determine the selected remedy as specified in the Record of Decision. A summary briefly describing the results of the evaluation of the alternatives is found in Table 1. A summary of the estimated capital costs and operation and maintenance costs for each alternative is found in Table 2.

The alternative evaluation process resulted in the isolation of four (4) possible alternatives that might satisfy the requirements for the final Site remediation. Alternatives 3 and 4 would achieve the required remedial objectives through continued groundwater treatment and by placing institutional or physical barriers to exposure. Alternatives 5A and 5B would achieve the desired remedial objectives through continued ground water treatment and removal of some contaminants and containment of the remainder of the contaminated media.

PROPOSED PREFERRED ALTERNATIVE.

The proposed remediation plan is a variant of **Alternative 5.** The proposed alternative consists of the following:

1. Green Carbon PCB Spill Area.

! Deed restriction; "hotspot' removal; reroute utilities, if necessary; low permeability multimedia cap;

! Operational controls to limit contact; monitor groundwater.

- Materials disposal : lower concentrations under the new Taylors Wash cap and higher concentrations to off-site landfill.

2. **Refractory Brick Disposal Area.**
   - Deed restriction; soil erosion cap; and fencing.
3. **Taylors Wash Area.**
   - Deed restriction; collect and treat leachate utilizing a new force main from the Wash to the existing groundwater treatment plant;
   - RCRA Subtitle D cap.
4. **Drum Storage Area.**
   - Excavate "hot spot" and dispose under Taylors Wash cap.
5. **PCB Soil Stockpile Area.**
   - Excavate "hot spots" and dispose under Taylors Wash cap.
6. **Site-wide Groundwater.**
   - Deed restrictions; continue remedial action operations; monitor groundwater.
7. **South Slurry Pond Closure/Post Closure.**
   - Continue maintenance of cap and cover; deed restriction; and monitor the ground water.

COMMUNITY PARTICIPATION.

The public meeting on the Proposed Plan pursuant to CERCLA Section 117(a) will be held on Wednesday, July 28, 1999, at 7:00 pm at the Lewisport Community Center, Corner of Pell and Community Center Drive, in Lewisport, Kentucky. The public comment period will extend from July 28, 1999, to August 28, 1999. During the thirty (30) day comment period, comments on the Proposed Plan will be accepted by the USEPA Remedial Project Manager and Community Involvement Coordinator whose telephone, fax, and internet addresses are listed below.

Mr. Antonio DeAngelo
Remedial Project Manager
Ph: 404-562-8826, Fax: 404-562-8788
deangelo.antonio@epa.gov

Ms. Cindy Gibson
Community Involvement Coordinator
Ph: 404-562-8808, Fax: 404-562-8788
gibson.cindy@epa.gov

USEPA Region 4
Mail Code: 4WD-NSMB
Sam Nunn Atlanta Federal Center
Tower Building - 11th Floor
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

The Kentucky Department for Environmental Protection Project Engineer, who can supply additional information, is:

Mr. Eric Liebenauer, P.E.
Superfund Branch
Waste Management Division
Kentucky Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601
Ph: 502-564-6716
Fax: 502-564-2705

The Administrative Record files for the National Southwire Aluminum Superfund Site may be accessed at two (2) locations:

1. Regional FOIA Office
   USEPA Region 4
   Sam Nunn AFC
   Tower Building - 11th Floor
   Atlanta, Georgia 30303-8960
   Ph: 404-562-9891
   Fax: 404-562-8054
   Internet: R4FOIA@EPAMAIL.EPA.GOV

2. Hancock County Public Library
   Court Street
   P.O. Box 249
   Hawesville, Kentucky 42348
   Ph: 502-927-6760

APPENDICES

APPENDIX C: INFORMATION REPOSITORIES

The Administrative Record files for the National Southwire Aluminum Superfund Site may be accessed at two (2) locations:

1. Regional FOIA Office
   USEPA Region 4
   Sam Nunn AFC
   Tower Building - 11th Floor
   Atlanta, Georgia 30303-8960
   Ph: 404-562-9891
   Fax: 404-562-8054
   Internet: R4FOIA@EPAMAIL.EPA.GOV

2. Hancock County Public Library
   Court Street
   P.O. Box 249
   Hawesville, Kentucky 42348
   Ph: 502-927-6760

<u>APPENDICES</u>

APPENDIX D: COST SUMMARIES FOR ALTERNATIVES

TABLE 1: SUMMARY OF EVALUATION OF ALTERNATIVES										
Nine Criteria $ (Pass / Fail)	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
Alternatives –	Threshold Criteria		Primary Modifying Criteria					Balancing Criteria [2]	
Alternative 1 [1]	F	F	F	F	F	P	P	?	?
Alternative 2	F	F	F	F	F	P	P	?	?
Alternative 3 [1]	P	F	P	P	P	P	P	?	?
Alternative 4 [1]	P	P	P	P	P	P	P	?	?
Alternative 5A [1]	P	P	P	P	P	P	P	?	?
Alternative 5C [1]	P	P	P	P	P	P	P	?	?
Alternative 6A	P	P	P	P	F	F	F	?	?
Alternative 6B	P	P	P	P	F	F	F	?	?
Alternative 6C	P	P	P	P	F	F	F	?	?

Notes:

(1) Theses alternatives retained for final detailed analysis and evaluation. Alternative 1, No Action, retained for comparison purposes only.

(2) The balancing Criteria are addressed after the Public Meeting and the Public Comment Period are completed and when the Record of Decision is finalized.

TABLE 2: COST SUMMARY FOR ALL ALTERNATIVES

Alternative	Estimated Total Capital Cost[1]	Estimated Total Annual O & M Cost[2]
Alternative 1	$2,450,000.00	$0.00
Alternative 2	$2,588,000.00	$20,000.00
Alternative 3	$4,588,000.00	$1,110,000.00
Alternative 4	$7,618,000.00	$1,373,424.00
Alternative 5A	$13,998,000.00	$1,375,000.00
Alternative 5B	$17,162,000.00	$1,375,000.00
Alternative 6A	$244,178,000.00	$1,363,000.00
Alternative 6B	$218,098,000.00	$1,563,000.00
Alternative 6C	$230,180,000.00	$1,363,000.00

Notes:

(1) Capital costs for the completed Groundwater Treatment Plan and the closure of the Old South Slurry Pond are included (Total = $2,450,000).
(2) This is the estimated operations and maintenance cost PER ANNUM for the remainder of the life of the Site or facility.

TABLE APP-D-1 : COST SUMMARY ALTERNATIVE 1 : No Action				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area		$0.00	0	$0
Refractory Brick Disposal Area		$0.00	0	$0
Taylors Wash		$0.00	0	$0
Drum Storage Area		$0.00	0	$0
PCB Soil Stockpile Area		$0.00	0	$0
Sitewide Groundwater		$0.00	0	$0
South Pond Closure / Post Closure		$0.00	0	$0
Subtotal				$0
	Miscellaneous (25 % of Subtotal)			$0
	Engineering (20 % of Subtotal)			$0
	Contingency (30 % of Subtotal			$0
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$0
	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
Total Capital Cost				$2,450,000
II. Annual O and M Cost				
		$0.00	$0	$0.00
	Subtotal			$0
	Miscellaneous (25 % of Subtotal)			$0
	Engineering (20 % of Subtotal)			$0
	Contingency (30 % of Subtotal)			$0
Total Annual O and M Cost				$0
III. Summary of Costs				
Total Capital Cost Including Cost of GWTS and OSSP Remediation				$2,450,000

Total Capital Cost <u>Less</u> of GWTS and OSSP Remediation	$0
Total Annual O and M Cost	$0
Total Present Worth Cost	$0

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 1					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7 %)**	**Present Worth**
0	$0	$0	$0	1.00	$0
1		$0	$0	0.935	$0
2		$0	$0	0.873	$0
3		$0	$0	0.816	$0
4		$0	$0	0.763	$0
5		$0	$0	0.713	$0
6		$0	$0	0.666	$0
7		$0	$0	0.623	$0
8		$0	$0	0.582	$0
9		$0	$0	0.544	$0
10		$0	$0	0.508	$0
11		$0	$0	0.475	$0
12		$0	$0	0.444	$0
13		$0	$0	0.415	$0
14		$0	$0	0.388	$0
15		$0	$0	0.362	$0
16		$0	$0	0.338	$0
17		$0	$0	0.316	$0
18		$0	$0	0.296	$0
19		$0	$0	0.277	$0
20		$0	$0	0.258	$0
21		$0	$0	0.242	$0
22		$0	$0	0.226	$0
23		$0	$0	0.211	$0
24		$0	$0	0.197	$0
25		$0	$0	0.184	$0
26		$0	$0	0.172	$0
27		$0	$0	0.161	$0
28		$0	$0	0.150	$0
29		$0	$0	0.141	$0
30		$0	$0	0.131	$0
TOTALS	$0	$0	$0		$0
Total Present Worth Cost					$0

TABLE APP-D-2 : COST SUMMARY ALTERNATIVE 2: Institutional Controls and Groundwater Monitoring				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Deed Restriction Groundwater Monitoring	each well	$500 $3,000	1 0	$500 $0
Refractory Brick Disposal Area				
Deed Restriction Fencing	each estimated	$500 $66,000	1 1	$500 $66,000
Taylors Wash				
Deed Restriction	each	$500	1	$500
Drum Storage Area				
No Action		$0	0	$0
PCB Soil Stockpile Area				
Deed Restriction	each	$500	1	$500
Sitewide Groundwater				
Deed Restriction Groundwater Monitoring	each	$500 $0	1	$500 $0
South Pond Closure / Post Closure				
Deed Restriction Groundwater Monitoring (incld in site-wide)	each	$500 $0	1	$500 $0
			Subtotal	$69,000
	Miscellaneous (25 % of Subtotal)			$17,250
	Engineering (20 % of Subtotal)			$13,800
	Contingency (30 % of Subtotal			$20,700
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$120,750
	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation				$2,750,750

II. Annual O and M Cost				
Maintain Fencing	nominal	$5,000	1	$5,000
Groundwater Monitoring	total	$5,000	1	$5,000
			Subtotal	$10,000
			Miscellaneous (25 % of Subtotal)	$2,500
			Engineering (20 % of Subtotal)	$2,000
			Contingency (30 % of Subtotal)	$3,000
			Total Annual O and M Cost	$17,500
III. Summary of Costs				
			Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation	$2,570,750
			Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation	$120,750
			Total Annual O and M Cost	$17,500
			Total Present Worth Cost	$338,077

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 2					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7 %)**	**Present Worth**
0	$120,750	$0	$120,750	1.00	$120,750
1		$17,500	$17,500	0.935	$16,363
2		$17,500	$17,500	0.873	$15,276
3		$17,500	$17,500	0.816	$14,280
4		$17,500	$17,500	0.763	$13,353
5		$17,500	$17,500	0.713	$12,478
6		$17,500	$17,500	0.666	$11,655
7		$17,500	$17,500	0.623	$10,903
8		$17,500	$17,500	0.582	$10,185
9		$17,500	$17,500	0.544	$9,520
10		$17,500	$17,500	0.508	$8,890
11		$17,500	$17,500	0.475	$8,313
12		$17,500	$17,500	0.444	$7,770
13		$17,500	$17,500	0.415	$7,263
14		$17,500	$17,500	0.388	$6,790
15		$17,500	$17,500	0.362	$6,335
16		$17,500	$17,500	0.338	$5,915
17		$17,500	$17,500	0.316	$5,530
18		$17,500	$17,500	0.296	$5,180
19		$17,500	$17,500	0.277	$4,848
20		$17,500	$17,500	0.258	$4,515
21		$17,500	$17,500	0.242	$4,435
22		$17,500	$17,500	0.226	$3,955
23		$17,500	$17,500	0.211	$3,693
24		$17,500	$17,500	0.197	$3,448
25		$17,500	$17,500	0.184	$3,220
26		$17,500	$17,500	0.172	$3,010
27		$17,500	$17,500	0.161	$2,818
28		$17,500	$17,500	0.150	$2,625
29		$17,500	$17,500	0.141	$2,468
30		$17,500	$17,500	0.131	$2,293
TOTALS	$120,750	$525,000	$645,750		$338,077
Total Present Worth Cost					$338,077

TABLE APP-D-3 : COST SUMMARY ALTERNATIVE 3: Institutional and Operational Controls				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Deed Restriction Groundwater Monitoring Operational Controls (existing)	each well	\$500 \$3,000 \$0	1 0 1	\$500 \$0 \$0
Refractory Brick Disposal Area				
Deed Restriction Fencing	each total	\$500 \$66,000	1 1	\$500 \$66,000
Taylors Wash				
Deed Restriction Solid Waste Cap (KY contained landfill)	each total	\$500 \$1,000,00	1 1	\$500 \$1,000,000
Drum Storage Area				
No Action		\$0	1	\$0
PCB Soil Stockpile Area				
Deed Restriction	each	\$500	1	\$500
Sitewide Groundwater				
Deed Restriction Continue Operations (existing) Groundwater Monitoring	each	\$500 \$0 \$0	1 1	\$500 \$0 \$0
South Pond Closure / Post Closure				
Deed Restriction Groundwater Monitoring (incld in site-wide) Maintenance and Post-Closure Care	each	\$500 \$0	1 1	\$500 \$0 \$0
			Subtotal	\$1,069,000
	Miscellaneous (25 % of Subtotal)			\$267,250
	Engineering (20 % of Subtotal)			\$213,800
	Contingency (30 % of Subtotal			\$320,700
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			\$1,870,750
	Ground Water Treatment System (est'd completed cost)			\$1,700,000

	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
Total Capital Cost				$4,320,750
II. Annual O and M Cost				
Operational Controls - Green Carbon	nominal	$5,000	1	$5,000
Maintain Fencing - Site-wide	nominal	$5,000	1	$5,000
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
	Subtotal			$555,000
	Miscellaneous (25 % of Subtotal)			$138,750
	Engineering (20 % of Subtotal)			$111,000
	Contingency (30 % of Subtotal)			$166,500
Total Annual O and M Cost				$971,250
III. Summary of Costs				
Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation				$4,320,750
Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation				$1,870,750
Total Annual O and M Cost				$971,250
Total Present Worth Cost				$13,921,053

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 3					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7%)**	**Present Worth**
0	$1,870,750	$0	$1,870,750	1.00	$1,870,750
1		$971,250	$971,250	0.935	$908,119
2		$971,250	$971,250	0.873	$847,901
3		$971,250	$971,250	0.816	$792,540
4		$971,250	$971,250	0.763	$741,064
5		$971,250	$971,250	0.713	$692,501
6		$971,250	$971,250	0.666	$646,853
7		$971,250	$971,250	0.623	$605,089
8		$971,250	$971,250	0.582	$565,268
9		$971,250	$971,250	0.544	$528,360
10		$971,250	$971,250	0.508	$493,395
11		$971,250	$971,250	0.475	$461,344
12		$971,250	$971,250	0.444	$431,235
13		$971,250	$971,250	0.415	$403,069
14		$971,250	$971,250	0.388	$376,845
15		$971,250	$971,250	0.362	$351,593
16		$971,250	$971,250	0.338	$328,283
17		$971,250	$971,250	0.316	$306,915
18		$971,250	$971,250	0.296	$287,490
19		$971,250	$971,250	0.277	$269,036
20		$971,250	$971,250	0.258	$250,583
21		$971,250	$971,250	0.242	$235,043
22		$971,250	$971,250	0.226	$219,503
23		$971,250	$971,250	0.211	$204,934
24		$971,250	$971,250	0.197	$191,336
25		$971,250	$971,250	0.184	$178,710
26		$971,250	$971,250	0.172	$167,055
27		$971,250	$971,250	0.161	$156,371
28		$971,250	$971,250	0.150	$145,688
29		$971,250	$971,250	0.141	$136,946
30		$971,250	$971,250	0.131	$127,234
TOTALS	$1,870,750	$29,137,500	$31,008,250		$13,921,053
Total Present Worth Cost					$13,921,053

TABLE APP-D-4 : COST SUMMARY ALTERNATIVE 4 : Containment				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring	well	$3,000	0	$0
Operational Controls (existing)		$0	1	$0
Paving in areas not already paved	total	$890,000	1	$890,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Soil / Erosion Cap	total	$535,000	1	$535,000
Taylors Wash				
Deed Restriction	each	$500	1	$500
Solid Waste Cap (KY contained landfill)	total	$1,000,000	1	$1,000,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap		$9,000	1	$9,000
PCB Soil Stockpile Area				
Deed Restriction	each	$500	1	$500
Soil Erosion Cap	estimate	$20,000	1	$20,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Continue Operations (existing)		$0	1	$0
Groundwater Monitoring		$0		$0
South Pond Closure / Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide)				$0
Maintenance and Post-Closure Care		$0	1	$0
			Subtotal	$2,584,000
	Miscellaneous (25% of Subtotal)			$646,000
	Engineering (20% of Subtotal)			$516,800
	Contingency (30% of Subtotal)			$775,200
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$4,522,000

	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$6,972,000
II. Annual O and M Cost				
Operational Controls - Green Carbon	nominal	$5,000	1	$5,000
Paving Repair - Green Carbon	total	$212	1	$212
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Lechate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
			Subtotal	$686,712
	Miscellaneous (25% of Subtotal)			$171,678
	Engineering (20% of Subtotal)			$137,342
	Contingency (30% of Subtotal)			$206,014
			Total Annual O and M Cost	$1,201,746
III. Summary of Costs				
			Total Capital Cost Including Cost of GWTS and OSSP Remediation	$6,972,000
			Total Capital Cost Less Cost of GWTS and OSSP Remediation	$4,522,000
			Total Annual O and M Cost	$1,201,746
			Total Present Worth Cost	$19,432,063

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 4					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7%)**	**Present Worth**
0	$4,522,000	$0	$4,522,000	1.00	$4,522,000
1		$1,201,746	$1,201,746	0.935	$1,123,633
2		$1,201,746	$1,201,746	0.873	$1,049,124
3		$1,201,746	$1,201,746	0.816	$980,625
4		$1,201,746	$1,201,746	0.763	$916,932
5		$1,201,746	$1,201,746	0.713	$856,845
6		$1,201,746	$1,201,746	0.666	$800,363
7		$1,201,746	$1,201,746	0.623	$748,688
8		$1,201,746	$1,201,746	0.582	$699,416
9		$1,201,746	$1,201,746	0.544	$653,750
10		$1,201,746	$1,201,746	0.508	$610,487
11		$1,201,746	$1,201,746	0.475	$570,829
12		$1,201,746	$1,201,746	0.444	$533,575
13		$1,201,746	$1,201,746	0.415	$498,725
14		$1,201,746	$1,201,746	0.388	$466,277
15		$1,201,746	$1,201,746	0.362	$435,032
16		$1,201,746	$1,201,746	0.338	$406,190
17		$1,201,746	$1,201,746	0.316	$379,752
18		$1,201,746	$1,201,746	0.296	$355,717
19		$1,201,746	$1,201,746	0.277	$332,884
20		$1,201,746	$1,201,746	0.258	$310,050
21		$1,201,746	$1,201,746	0.242	$290,823
22		$1,201,746	$1,201,746	0.226	$271,595
23		$1,201,746	$1,201,746	0.211	$253,568
24		$1,201,746	$1,201,746	0.197	$236,744
25		$1,201,746	$1,201,746	0.184	$221,121
26		$1,201,746	$1,201,746	0.172	$206,700
27		$1,201,746	$1,201,746	0.161	$193,481
28		$1,201,746	$1,201,746	0.150	$180,262
29		$1,201,746	$1,201,746	0.141	$169,446
30		$1,201,746	$1,201,746	0.131	$157,429
TOTALS	$4,522,000	$36,052,380	$40,574,380		$19,432,063
Total Present Worth Cost					$19,432,063

TABLE APP-D-5A : COST SUMMARY ALTERNATIVE 5A : Hotspot Removal and Containment - Off-Site Landfill Disposal				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Deed Restriction	each	$500	1	$500
GW Monitoring & Operational Controls (Existing)	well	$3,000	0	$0
Reroute Utilities	total	$331,000	1	$331,000
Excavate Hotspots and Dispose Off-Site	total	$2,973,000	1	$2,973,000
Low Permeability Multi-Media Cap	total	$601,000	1	$601,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Soil / Erosion Cap	total	$535,000	1	$535,000
Taylors Wash				
Deed Restriction	each	$500	1	$500
RCRA Cap (KY contained landfill plus one layer)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap		$9,000	1	$9,000
PCB Soil Stockpile Area				
Deed Restriction	each	$500	1	$500
Soil Erosion Cap	estimate	$60,000	1	$60,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Continue Operations (existing)		$0	1	$0
Groundwater Monitoring		$0		$0
South Pond Closure / Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care		$0	1	$0
			Subtotal	$5,774,000
			Miscellaneous (25% of Subtotal)	$1,443,500
			Engineering (20% of Subtotal)	$1,154,800
			Contingency (30% of Subtotal)	$1,732,200

	Capital Costs (+ Miscellaneous, Engineering, Contingency)			$10,104,500
	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$12,554,500
II. Annual O and M Cost				
Operational Controls - Green Carbon	nominal	$5,000	1	$5,000
Paving Repair - Green Carbon	nominal	$1,000	1	$1,000
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
	Subtotal			$687,500
	Miscellaneous (25% of Subtotal)			$171,875
	Engineering (20% of Subtotal)			$137,500
	Contingency (30% of Subtotal)			$206,250
	Total Annual O and M Cost			$1,203,125
III. Summary of Costs				
Total Capitol Cost <u>Including</u> Cost of GWTS and OSSP Remediation				$12,554,500
Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation				$10,104,500
Total Annual O and M Cost				$1,203,125
Total Present Worth Cost				$25,063,236

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 5A					
Year	Capital Cost	Annual O & M Cost	Total Annual Cost	Discount Factor (7%)	Present Worth
0	$10,104,500	$0	$10,104,500	100	$10,104,500
1		$1,203,125	$1,203,125	0.935	$1,124,922
2		$1,203,125	$1,203,125	0.873	$1,073,899
3		$1,203,125	$1,203,125	0.816	$981,750
4		$1,203,125	$1,203,125	0.763	$917,984
5		$1,203,125	$1,203,125	0.713	$857,828
6		$1,203,125	$1,203,125	0.666	$801,281
7		$1,203,125	$1,203,125	0.623	$749,547
8		$1,203,125	$1,203,125	0.582	$700,219
9		$1,203,125	$1,203,125	0.544	$654,500
10		$1,203,125	$1,203,125	0.508	$611,188
11		$1,203,125	$1,203,125	0.475	$571,484
12		$1,203,125	$1,203,125	0.444	$534,188
13		$1,203,125	$1,203,125	0.415	$499,297
14		$1,203,125	$1,203,125	0.388	$466,813
15		$1,203,125	$1,203,125	0.362	$435,531
16		$1,203,125	$1,203,125	0.338	$406,656
17		$1,203,125	$1,203,125	0.316	$380,188
18		$1,203,125	$1,203,125	0.296	$364,117
19		$1,203,125	$1,203,125	0.277	$333,266
20		$1,203,125	$1,203,125	0.258	$310,406
21		$1,203,125	$1,203,125	0.242	$291,156
22		$1,203,125	$1,203,125	0.226	$271,906
23		$1,203,125	$1,203,125	0.211	$253,859
24		$1,203,125	$1,203,125	0.197	$237,016
25		$1,203,125	$1,203,125	0.184	$221,375
26		$1,203,125	$1,203,125	0.172	$206,938
27		$1,203,125	$1,203,125	0.161	$193,703
28		$1,203,125	$1,203,125	0.150	$180,469
29		$1,203,125	$1,203,125	0.141	$169,641
30		$1,203,125	$1,203,125	0.131	$157,609
TOTALS	$10,104,500	$36,093,750	$46,198,250		$25,063,236
Total Present Worth Cost					$25,063,236

TABLE APP-5B : COST SUMMARY ALTERNATIVE 5B : Hotspot Removal and Containment - Ex-Situ Thermal Treatmemt				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Deed Restriction	each	$500	1	$500
GW Monitoring & Operational Controls (Existing)	well	$3,000	0	$0
Reroute Utilities	total	$327,000	1	$327,000
Excavate Hotspots and Dispose (On-Site Thermal)	total	$4,316,000	1	$4,316,000
Low Permeability Multi-Media Cap	total	$601,000	1	$601,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Soil/Erosion Cap	total	$535.000	1	$535,000
Taylors Wash				
Deed Restriction	each	$500	1	$500
RCRA Cap (KY contained landfill plus one lever)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap		$9,000	1	$9,000
PCB Soil Stockpile Area				
Deed Restriction	each	$500	1	$500
Excavate Hotspot, Dispose, and Backfill	total	$303,000	1	$303,000
Site-wide Groundwater				
Deed Restricton	each	$500	1	$500
Continue Operations (existing)		$0	1	$0
Groundwater Monitoring (established)		$0		$0
South Pond Closure / Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care (existing)		$0	1	$0
			Subtotal	$7,356,000
	Miscellaneous (25% of Subtotal)			$1,839,000
	Engineering (20% of Subtotal)			$1,471,200
	Contingency (30% of Subtotal)			$2,206,800

	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$12,873,000
	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$15,323,000
II. Annual O and M Cost				
Operational Controls - Green Carbon	nominal	$5,000	1	$5,000
Paving Repair - Green Carbon	nominal	$1,000	1	$1,000
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	6,500
	Subtotal			$687,500
	Miscellaneous (25% of Subtotal)			$171,875
	Engineering (20% of Subtotal)			$137,500
	Contingency (30% of Subtotal)			$206,250
			Total Annual O and M Cost	$1,203,125
III. Summary of Costs				
			Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation	$15,323,000
			Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation	$12,873,000
			Total Annual O and M Cost	$1,203,125
			Total Present Worth Cost	$27,864,109

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 5B					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7%)**	**Present Worth**
0	$12,873,000	$0	$12,873,000	1.00	$12,873,000
1		$1,203,125	$1,203,125	0.935	$1,124,922
2		$1,203,125	$1,203,125	0.873	$1,073,899
3		$1,203,125	$1,203,125	0.816	$981,750
4		$1,203,125	$1,203,125	0.763	$917,984
5		$1,203,125	$1,203,125	0.713	$877,079
6		$1,203,125	$1,203,125	0.666	$801,281
7		$1,203,125	$1,203,125	0.623	$749,547
8		$1,203,125	$1,203,125	0.582	$700,219
9		$1,203,125	$1,203,125	0.544	$654,500
10		$1,203,125	$1,203,125	0.508	$611,188
11		$1,203,125	$1,203,125	0.475	$571,484
12		$1,203,125	$1,203,125	0.444	$546,176
13		$1,203,125	$1,203,125	0.415	$499,297
14		$1,203,125	$1,203,125	0.388	$466,813
15		$1,203,125	$1,203,125	0.362	$435,531
16		$1,203,125	$1,203,125	0.338	$415,782
17		$1,203,125	$1,203,125	0.316	$380,188
18		$1,203,125	$1,203,125	0.296	$356,125
19		$1,203,125	$1,203,125	0.277	$333,266
20		$1,203,125	$1,203,125	0.258	$310,406
21		$1,203,125	$1,203,125	0.242	$291,156
22		$1,203,125	$1,203,125	0.226	$271,906
23		$1,203,125	$1,203,125	0.211	$253,859
24		$1,203,125	$1,203,125	0.197	$237,016
25		$1,203,125	$1,203,125	0.184	$221,275
26		$1,203,125	$1,203,125	0.172	$206,938
27		$1,203,125	$1,203,125	0.161	$193,703
28		$1,203,125	$1,203,125	0.150	$180,469
29		$1,203,125	$1,203,125	0.141	$169,641
30		$1,203,125	$1,203,125	0.131	$157,609
TOTALS	$12,873,000	$36,093,750	$48,966,750		$27,864,109
Total Present Worth Cost					$27,864,109

TABLE APP-D-6A: COST SUMMARY ALTERNATIVE 6A: Complete Removal - Dispose in Off-Site Landfill				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Decommission, demolish, rebuild	total	$7,517,000	1	$7,517,000
Anode supply during remediation	total	$92,700,000	1	$92,700,000
Excavation and removal of contaminated soil	total	$15,628,000	1	$15,628,000
Reroute utilities during excavation	total	$327,000	1	$327,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Excavate and Dispose	total	2,923,000	1	$2,923,000
Taylors Wash				
Deed Restrictions	each	$500	1	$500
RCRA Cap (KY contained landfill plus one layer)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap	total	$2,000	1	$2,000
PCB Soil Stockpile Area				
Excavate Hotspot, Dispose (TSCA), and Backfill	estimate	$303,000	1	$303,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Expand GW Extraction Operations (New Booster and Two Wells)	estimate	$200,000	1	$200,000
Groundwater Monitoring (Established)		$0		$0
South Pond Closure/Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care (existing)		$0	1	$0
			Subtotal	$120,864,000
	Miscellaneous (25 % of Subtotal)			$30,216,000
	Engineering (20 % of Subtotal)			$24,172,800
	Contingency (30 % of Subtotal)			$36,259,200
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$211,512,000

	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$213,962,000
II. Annual O and M Cost				
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring - Site-Wide	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
			Subtotal	$681,500
			Miscellaneous (25 % of Subtotal)	$170,375
			Engineering (10 % of Subtotal)	$136,300
			Contingency (30 % of Subtotal)	$204,450
			Total Annual O and M Cost	$1,192,625
III. Summary of Costs				
			Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation	$213,962,000
			Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation	$211,512,000
			Total Annual O and M Cost	$1,192,625
			Total Present Worth Cost	$226,313,900

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 6A					
Year	**Capital Cost**	**Annual O & M Cost**	**Total Annual Cost**	**Discount Factor (7%)**	**Present Worth**
0	$211,512,000	$0	$211,512,000	1.00	$211,512,000
1		$1,192,625	$1,192,625	0.935	$1,115,104
2		$1,192,625	$1,192,625	0.873	$1,041,162
3		$1,192,625	$1,192,625	0.816	$973,182
4		$1,192,625	$1,192,625	0.763	$909,973
5		$1,192,625	$1,192,625	0.713	$850,342
6		$1,192,625	$1,192,625	0.666	$794,288
7		$1,192,625	$1,192,625	0.623	$743,005
8		$1,192,625	$1,192,625	0.582	$694,108
9		$1,192,625	$1,192,625	0.544	$648,788
10		$1,192,625	$1,192,625	0.508	$605,854
11		$1,192,625	$1,192,625	0.475	$566,497
12		$1,192,625	$1,192,625	0.444	$529,526
13		$1,192,625	$1,192,625	0.415	$494,939
14		$1,192,625	$1,192,625	0.388	$467,739
15		$1,192,625	$1,192,625	0.362	$431,730
16		$1,192,625	$1,192,625	0.338	$403,107
17		$1,192,625	$1,192,625	0.316	$376,870
18		$1,192,625	$1,192,625	0.296	$353,017
19		$1,192,625	$1,192,625	0.277	$330,357
20		$1,192,625	$1,192,625	0.258	$307,697
21		$1,192,625	$1,192,625	0.242	$288,615
22		$1,192,625	$1,192,625	0.226	$269,533
23		$1,192,625	$1,192,625	0.211	$251,644
24		$1,192,625	$1,192,625	0.197	$234,947
25		$1,192,625	$1,192,625	0.184	$219,443
26		$1,192,625	$1,192,625	0.172	$205,132
27		$1,192,625	$1,192,625	0.161	$192,013
28		$1,192,625	$1,192,625	0.150	$178,894
29		$1,192,625	$1,192,625	0.141	$168,160
30		$1,192,625	$1,192,625	0.131	$156,234
TOTALS	$211,512,000	$35,778,750	$247,290,750		$226,313,900
Total Present Worth Cost					$226,313,900

TABLE APP-D-6B: COST SUMMARY ALTERNATIVE 6B: Complete Removal - Dispose in On-Site Landfill				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Decommission, demolish, rebuild	total	$7,517,000	1	$7,517,000
Anode supply during remediation	total	$92,700,000	1	$92,700,000
Excavation and removal of contaminated soil on-site	total	$2,312,000	1	$2,312,000
Shoring to protect structures	total	$272,000	1	$272,000
Reroute utilities during excavation	total	$330,000	1	$330,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Excavate and Dispose	total	2,923,000	1	$2,923,000
Taylors Wash				
Deed Restriction	each	$500	1	$500
RCRA Cap (KY contained landfill plus one layer)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap	total	$2,000	1	$2,000
PCB Soil Stockpile Area				
Excavate Hotspot, Dispose (SW), and Backfill	estimate	$304,000	1	$304,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Expand GW Extraction Operations (New Booster and Two Wells)	estimate	$200,000	1	$200,000
Groundwater Monitoring (Established)		$0		$0
South Pond Closure/Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care (existing)		$0	1	$0
			Subtotal	$107,824,000
	Miscellaneous (25 % of Subtotal)			$26,956,000
	Engineering (20 % of Subtotal)			$21,564,800
	Contingency (30 % of Subtotal)			$32,347,200
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$188,692,000

	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$191,142,000
II. Annual O and M Cost				
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Maintenance - On-Site TSCA Landfill	estimate	$100,000	1	$100,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring - Site-Wide	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
			Subtotal	$781,500
			Miscellaneous (25 % of Subtotal)	$195,375
			Engineering (20 % of Subtotal)	$156,300
			Contingency (30 % of Subtotal)	$234,450
			Total Annual O and M Cost	$1,367,625
III. Summary of Costs				
			Total Capital Cost Including Cost of GWTS and OSSP Remediation	$191,142,000
			Total Capital Cost Less Cost of GWTS and OSSP Remediation	$188,692,000
			Total Annual O and M Cost	$1,367,625
			Total Present Worth Cost	$205,649,184

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 6B					
Year	Capital Cost	Annual O & M Cost	Total Annual Cost	Discount Factor (7%)	Present Worth
0	$188,692,000	$0	$188,692,000	1.00	$188,692,000
1		$1,367,625	$1,367,625	0.935	$1,278,729
2		$1,367,625	$1,367,625	0.873	$1,193,937
3		$1,367,625	$1,367,625	0.816	$1,115,982
4		$1,367,625	$1,367,625	0.763	$1,043,498
5		$1,367,625	$1,367,625	0.713	$975,117
6		$1,367,625	$1,367,625	0.666	$910,838
7		$1,367,625	$1,367,625	0.623	$852,030
8		$1,367,625	$1,367,625	0.582	$795,958
9		$1,367,625	$1,367,625	0.544	$743,988
10		$1,367,625	$1,367,625	0.508	$694,754
11		$1,367,625	$1,367,625	0.475	$649,622
12		$1,367,625	$1,367,625	0.444	$607,226
13		$1,367,625	$1,367,625	0.415	$567,564
14		$1,367,625	$1,367,625	0.388	$530,639
15		$1,367,625	$1,367,625	0.362	$495,080
16		$1,367,625	$1,367,625	0.338	$462,257
17		$1,367,625	$1,367,625	0.316	$432,170
18		$1,367,625	$1,367,625	0.296	$404,817
19		$1,367,625	$1,367,625	0.277	$378,832
20		$1,367,625	$1,367,625	0.258	$341,906
21		$1,367,625	$1,367,625	0.242	$330,965
22		$1,367,625	$1,367,625	0.226	$309,083
23		$1,367,625	$1,367,625	0.211	$288,569
24		$1,367,625	$1,367,625	0.197	$269,422
25		$1,367,625	$1,367,625	0.184	$251,643
26		$1,367,625	$1,367,625	0.172	$235,232
27		$1,367,625	$1,367,625	0.161	$220,188
28		$1,367,625	$1,367,625	0.150	$205,144
29		$1,367,625	$1,367,625	0.141	$192,835
30		$1,367,625	$1,367,625	0.131	$179,159
TOTALS	$188,692,000	$41,028,750	$229,720,750		$205,649,184
Total Present Worth Cost					$205,649,184

TABLE APP-D-6C: COST SUMMARY ALTERNATIVE 6C: Complete Removal -On-Site Thermal Treatment				
Description	**Unit**	**Unit Cost**	**Amount**	**Cost**
I. CAPITAL COST				
Green Carbon Area				
Decommission, demolish, rebuild	total	$7,517,000	1	$7,517,000
Anode supply during remediation	total	$92,700,000	1	$92,700,000
Excavation and removal of contam'ted soil on-site	total	$8,357,000	1	$8,357,000
Shoring to protect structures	total	$272,000	1	$272,000
Reroute utilities during excavation	total	$327,000	1	$327,000
Refractory Brick Disposal Area				
Deed Restriction	each	$500	1	$500
Excavate and Dispose	total	2,923,000	1	$2,923,000
Taylors Wash				
Deed Restrictions	each	$500	1	$500
RCRA Cap (KY contained landfill plus one layer)	total	$1,135,000	1	$1,135,000
Collect and Dispose of Leachate	total	$127,000	1	$127,000
Drum Storage Area				
Excavate and Dispose Under Taylors Wash Cap	total	$2,000	1	$2,000
PCB Soil Stockpile Area				
Excavate Hotspot, Dispose (SW), and Backfill	estimate	$303,000	1	$303,000
Site-wide Groundwater				
Deed Restriction	each	$500	1	$500
Expand GW Extraction Operations (New Booster and Two Wells)	estimate	$200,000	1	$200,000
Groundwater Monitoring (Established)		$0		$0
South Pond Closure/Post Closure				
Deed Restriction	each	$500	1	$500
Groundwater Monitoring (incld in site-wide above)				$0
Maintenance and Post-Closure Care (existing)		$0	1	$0
			Subtotal	$113,865,000
	Miscellaneous (25 % of Subtotal)			$28,466,250
	Engineering (20 % of Subtotal)			$22,773,250
	Contingency (30 % of Subtotal)			$34,159,500
	Capital Cost (+ Miscellaneous, Engineering, Contingency)			$199,263,750

	Ground Water Treatment System (est'd completed cost)			$1,700,000
	Old South Slurry Pond Remediation (est'd completed cost)			$750,000
			Total Capital Cost	$201,713,750
II. Annual O and M Cost				
Maintain Fencing - Site-Wide	nominal	$5,000	1	$5,000
Maintenance - Refractory Brick Area Cap	nominal	$500	1	$500
Maintenance - Taylors Wash	total	$3,500	1	$3,500
Taylors Wash Leachate Management	estimate	$131,000	1	$131,000
Continue GWTP Operations	total	$525,000	1	$525,000
Groundwater Monitoring - Site-Wide	total	$10,000	1	$10,000
Maintenance - South Pond	total	$6,500	1	$6,500
			Subtotal	$681,500
			Miscellaneous (25 % of Subtotal)	$170,375
			Engineering (20 % of Subtotal)	$136,300
			Contingency (30 % of Subtotal)	$204,450
			Total Annual O and M Cost	$1,192,625
III. Summary of Costs				
			Total Capital Cost <u>Including</u> Cost of GWTS and OSSP Remediation	$201,713,750
			Total Capital Cost <u>Less</u> Cost of GWTS and OSSP Remediation	$199,263,750
			Total Annual O and M Cost	$1,192,625
			Total Present Worth Cost	$214,060,650

SUMMARY OF PRESENT WORTH ANALYSIS - Alternative 6C					
Year	Capital Cost	Annual O & M Cost	Total Annual Cost	Discount Factor (7%)	Present Worth
0	$199,263,750	$0	$199,263,750	1.00	$199,263,750
1		$1,192,625	$1,192,625	0.935	$1,115,104
2		$1,192,625	$1,192,625	0.873	$1,041,162
3		$1,192,625	$1,192,625	0.816	$973,182
4		$1,192,625	$1,192,625	0.763	$909,973
5		$1,192,625	$1,192,625	0.713	$850,342
6		$1,192,625	$1,192,625	0.666	$794,288
7		$1,192,625	$1,192,625	0.623	$743,005
8		$1,192,625	$1,192,625	0.582	$694,108
9		$1,192,625	$1,192,625	0.544	$648,788
10		$1,192,625	$1,192,625	0.508	$605,854
11		$1,192,625	$1,192,625	0.475	$566,497
12		$1,192,625	$1,192,625	0.444	$529,526
13		$1,192,625	$1,192,625	0.415	$494,939
14		$1,192,625	$1,192,625	0.388	$462,739
15		$1,192,625	$1,192,625	0.362	$431,730
16		$1,192,625	$1,192,625	0.338	$403,107
17		$1,192,625	$1,192,625	0.316	$376,870
18		$1,192,625	$1,192,625	0.296	$353,017
19		$1,192,625	$1,192,625	0.277	$330,357
20		$1,192,625	$1,192,625	0.258	$307,697
21		$1,192,625	$1,192,625	0.242	$288,615
22		$1,192,625	$1,192,625	0.226	$269,533
23		$1,192,625	$1,192,625	0.211	$251,644
24		$1,192,625	$1,192,625	0.197	$234,947
25		$1,192,625	$1,192,625	0.184	$219,443
26		$1,192,625	$1,192,625	0.172	$205,132
27		$1,192,625	$1,192,625	0.161	$192,013
28		$1,192,625	$1,192,625	0.150	$178,894
29		$1,192,625	$1,192,625	0.141	$168,160
30		$1,192,625	$1,192,625	0.131	$156,234
TOTALS	$199,263,750	$35,778,750	$235,042,500		$214,060,650
Total Present Worth Cost					$214,060,650